This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

237

62D CONGRESS : : 2D SESSION

DECEMBER 4, 1911-AUGUST 26, 1912

HOUSE DOCUMENTS

VOL. 25

WASHINGTON : : GOVERNMENT PRINTING OFFICE : : 1912

Digitized by Google

Digitized by Google

CONTENTS

No.
419. Examination of Ogunquit Harbor, Me.
420. Examination of Bluehill Inner Harbor, Me.
421. Examination of Rockland Harbor, Me.
422. Examination of St. Croix River at Afton, Minn.
423. Examination of Kennebunk River, Me.
424. Examination of Choctawhatchee Bay, Fla.
425. Examination of Corea Harbor, Gouldsboro, Me.
426. Examination of Mount Sinai Harbor, N. Y.
427. Examination of Little Neck Bay, N. Y.
428. Examination of Abita River, La.
429. Examination of Pithlachascotee River, Fla.
438. Examination and survey of Willamette River, Oreg.
442. Examination, etc., of harbor at New Bedford and Fairhaven, Mass.
443. Examination and survey of Altamaha, Oconee, and Ocmulgee rivers.
450. Examination of Petoskey Harbor, Mich.
455. Examination for channel connecting Miles and Tred Avon rivers, Md.
456. Examination of Newport News Harbor, Va., and adjacent waters.
457. Examination of Salkehatchie River, S. C.
463. Examination of Chipola River, Fla.
464. Examination of Santa Barbara Harbor, Cal.
471. Examination of St. Lucie Inlet, Fla.
472. Examination of harbor of refuge in Neah Bay, Wash.
480. Examination and survey of Little Kanawha River, W. Va.
489. Examination and survey of Portland Harbor, Me.
493. Examination of St. Johns River, Fla.
512. Examination and survey of St. Petersburg Harbor, Fla.
513. Examination of Archers Creek, S. C.
519. Examination and survey of Yaquina River, Oreg., from Toledo to Yaquina.
520. Examination and survey of South River, N. J.
528. Examination for harbor of refuge, etc., at Cape Lookout, N. C.
535. Examination and survey of New Haven Harbor, Conn.
536. Examination and survey of Nantucket Sound, Mass.
540. Examination of Allegheny River, Pa.
546. Examination of channel from Core Sound to Newport River, N. C.
549. Examination and survey of Niagara River, N. Y.
550. Examination and survey of Buffalo Harbor, N. Y.

261745

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 419.

OGUNQUIT HARBOR, ME.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF OGUNQUIT HARBOR, ME.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated September 30, 1911, of a preliminary examination of Ogunquit Harbor, Me., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated September 30, 1911, from Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination of Ogunquit Harbor, Me., called for by the river and harbor act of June 25, 1910.

Ogunquit is located about 30 miles southwest of Portland, Me., and Perkins Cove, at the mouth of Josius River, which is the harbor for Ogunquit, is 1 mile south of Ogunquit. Interested parties desire the construction of a breakwater and possibly some dredging for the pro-

Digitized by Google

tection of about a dozen fishing boats, but the district officer reports that the interests involved are so small the resulting benefits would not justify the cost of necessary work. The division engineer concurs in this opinion.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated November 6, 1911, concurring in the views of the district officer and the division engineer. No communications were received in response to notices of this unfavorable report.

After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors; and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Ogunquit Harbor, Me., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF OGUNQUIT HARBOR, ME.

United States Engineer Office,
Portland, Me., September 30, 1911.

Sir: I have the honor to submit the following report on a preliminary examination of Ogunquit Harbor, Me., directed by the river and harbor act approved June 25, 1910.

Ogunquit is a locality about 30 miles southwest from Portland, Me., on the Atlantic coast. It is shown, though on a small scale, on Coast Survey Chart No. 108. It is in the town of Wells, county of York. There is a narrow beach, called Ogunquit Beach, about 3 miles in length, and between this and the mainland is a very shallow sheet of water into which empty Ogunquit River and one or two other small streams. On the Geological Survey map there are two localities given the name of Ogunquit. They lie about 2 miles apart, one about midway of the beach and the other at the lower end of the beach. The Atlantic Shore Line Railway, an electric road, runs along the coast about 1 mile back from the shore, and it is by this means of transportation that one reaches the locality after leaving the steam railroad. The neighborhood has become quite a popular summer resort, but the permanent population is very small.

I visited the locality August 24, 1911. There is no harbor at Ogunquit, no commerce, no demand, and, so far as I could learn, no prospect of any. About 1 mile south of Ogunquit, at the mouth of Josius River, there is a small cove, called Perkins Cove, which is the harbor for Ogunquit. It is a small indentation, or widening of the river mouth, about one-fourth of a mile long, about 100 feet wide about midway of its length, increasing in width from thence to the sea. About one-half the area of the cove is bare at low tide. This harbor or cove is used by about a dozen dories and small power boats used by local fishermen. It is said that the annual earnings of these

Digitized by Google

boats average about $800 each. Their catch is disposed of locally, and some of it is hauled to the trolley line and shipped to other points. Through correspondence and personal inquiry and observation I learned that what is desired by those instrumental in causing the order for the preliminary examination is the construction of a breakwater at Perkins Cove, with possibly some dredging. This desire arises from the statement of the fishermen that, owing to lack of protection, they are subject to loss or damage to their fishing boats and gear.

There are no wharves of any description, either at Ogunquit or at Perkins Cove. There is no navigation aside of the dozen or more small boats above referred to. There are no industries aside from the interests of the small fishing fleet at Perkins Cove.

The construction of a small breakwater and possibly a small quantity of dredging would, in my opinion, improve conditions at Perkins Cove, but from what I observed on the occasion of my visit, and what I have learned from correspondence and conversation with others, I am convinced that the interests involved are so small that any expenditure of public money would not be justified. An improvement would be of great benefit to the fishermen, but the end would not justify the means.

There are no matters of land reclamation nor of water-power development to be connected in any way with the desired improvement.

In view of the above, I am of the opinion that neither Ogunquit, where there is nothing in the way of commerce, nor Perkins Cove, where there is a small fishing business, are worthy of improvement by the National Government.

Very respectfully,

W. E. Craighill,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, United States Army.
(Through the Division Engineer).

[First indorsement.]

Northeast Division Engineer Office,
New York, October 3, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer.

W. M. Black,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, November 6, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Ogunquit is a small community about 30 miles southwest from Portland. There is a narrow beach about 3 miles in length, and between this and the mainland is a very shallow sheet of water. The maps indicate two places bearing the name Ogunquit, one about midway of the beach and the other at its lower end. The neighborhood has become a popular summer resort, but the permanent popula-

Digitized by Google

tion is very small. The district officer states that there is no harbor at Ogunquit, no commerce, and, so far as he could learn, no prospect of any. About 1 mile south of Ogunquit, however, is a small cove called Perkins Cove, which is used by local fishermen. There are about a dozen dories and small power boats, the annual earnings of which are said to amount to about $800 each. It appears that local interests desire the construction of a breakwater for the protection of these boats, with possibly some dredging. While the desired improvement is feasible, the district officer is convinced that the interests involved are so small that any expenditure of public money at this locality would not be justified. After consideration of the information presented, the board joins the division engineer in concurring in this opinion.

No communications have been received from interested parties, who were advised of the findings of the district officer and invited to submit statements and arguments to the board. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which would be coordinated with the suggested improvement in such manner as to render it advisable in the interests of general commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 420.

BLUEHILL INNER HARBOR, ME.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF BLUEHILL INNER HARBOR, ME.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated August 14, 1911, of a preliminary examination of Bluehill Inner Harbor, Me., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated August 14, 1911, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination of Bluehill Inner Harbor, Me., called for by the river and harbor act approved February 27, 1911.

Bluehill Inner Harbor, which is small and shoal, with narrow, crooked entrance, much obstructed by ledges, lies at the head of Blue-

Digitized by Google

hill Bay, a wide, deep arm of the sea along the west side of Mount Desert Island. There is a public wharf at the upper end of the harbor, where the village of Bluehill is located. For a distance of about one-third of a mile from the wharf the bottom of the harbor is bare at low tide, so that vessels can approach and leave the public wharf only at or near high water. Interested parties desire the improvement of this inner harbor by the dredging of a channel 100 feet wide and 6 feet deep at mean low water, leading to the public wharf above mentioned. The district officer reports that the interests involved are so small the resulting benefits would not justify the cost of necessary work. The division engineer concurs in this opinion.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated September 26, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Bluehill Inner Harbor, Me., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF BLUEHILL INNER HARBOR, ME.

United States Engineer Office,
Portland, Me., August 14, 1911.

Sir: I have the honor to submit the following report on a preliminary examination of Bluehill Inner Harbor, Me., directed by the river and harbor act approved February 27, 1911.

The town of Bluehill is in Hancock County, Me., and lies about 14 miles southwest of Ellsworth. The town has an area of probably from 60 to 70 square miles, in which there are several settlements, the principal one being the village of Bluehill. Four of these villages have post offices. The population of the entire town in 1900 was placed at 1,828, and the polls at 506. The village of Bluehill is located at the head of Bluehill Inner Harbor, which is at the head of Bluehill Bay, a wide, deep arm of the sea. The inner harbor is small and shoal, with a narrow, crooked entrance much obstructed by ledges. The upper end of the inner harbor, where the village is located, runs dry at low tide, exposing a large area of flats.

Bluehill Harbor was the subject of a preliminary examination in 1890, the report on which is published as House Executive Document No. 19, Fifty-first Congress, second session. The work at that time desired was the removal of extensive ledges at the entrance to the inner harbor. The amount of business was found to be small, the improvements desired were expensive and of large extent, and the report was adverse.

Digitized by Google

The nearest railroad station is Ellsworth, about 14 miles distant. During the summer there is a small steamer to and from Rockland daily except Monday. During other seasons the trips are less frequent. There is a stage line to Ellsworth.

About 10 feet can be carried at mean low tide into the harbor, but the area of this depth is small, and the remainder of the harbor is shoal, with numerous ledges projecting above the level of mean low tide. The steamboat landing is on the right in entering the inner harbor, near its entrance, and it is said that about 10 feet at mean low tide can be carried to the wharf. The only other wharf is at the upper end or head of the harbor, where the village is located. This is a public wharf. It is small, but sufficient to accommodate all needs. For a distance of about one-third of a mile from the wharf the bottom is bare at low tide, so that vessels can approach and leave the wharf only at or near high water. The tidal fluctuation at this place is about 10 feet.

I made a personal visit to the locality June 23, 1911, and met Edward E. Chase, Esq., judge of probate of Hancock County and chairman of the board of selectmen of Bluehill, and also other persons locally interested. It appears that there is little or no shipping aside from that conducted by the small steamer which lands near the mouth of the inner harbor. There is a small sawmill in the village near the public wharf, but the output is limited. It was said by Judge Chase that what is desired is the excavation of a channel about 100 feet wide and 6 feet deep at mean low water leading up to the public landing at the village. Such a channel would have to be rather more than half a mile long. He stated that there are in the neighborhood of 50 small cottages on the two points which mark the entrance of the inner harbor, the occupants of which come in June and many of them remain until October. These people desire to go to the village for supplies, but, owing to the lack of water, it is impossible to reach the wharf in a boat for four or five hours each day. It is to accommodate these people as well as to develop other business that the dredging is desired. From about midway of the two points mentioned up to the public landing is about 1 mile by water; by land, over very good roads, the distance from the point on the north side of the harbor entrance to the village is about the same distance. On the south side of the harbor the distance out to the point is perhaps 1¼ miles. The locality has telephone service.

The terminal facilities are sufficient for the present or any prospective business.

There are no matters in the way of development of water power, projects for reclamation, or other subjects of a similar kind to be considered in connection with any project for improvement at this place in such way as to have any effect or bearing upon any work which may be done by the Government. The only wharf at the village is a public one and is sufficient for present needs. There is ample room for additional wharves should such be found to be needed.

In view of the considerable amount of excavation which would have to be done in order to provide the desired improvement of Bluehill Inner Harbor, a project which would apparently involve more or less expensive ledge excavation, and considering the unimportant traffic which it is desired to accommodate, a traffic which can be well and easily conducted by land, I am of the opinion that the public

Digitized by Google

benefits to be derived would not be sufficient to justify the expenditure, and have arrived at the conclusion that Bluehill Inner Harbor is not worthy of improvement at the cost of the National Government.

Very respectfully,

W. E. CRAIGHILL,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, N. Y., August 17, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 26, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Bluehill Inner Harbor is situated at the head of Bluehill Bay, a wide, deep arm of the sea. A depth of about 10 feet at mean low water can be carried for some distance into the inner harbor, but beyond this point the harbor is shoal and the upper end, where the village of Bluehill is situated, runs dry at low tide, exposing a large area of flats. A small public wharf, sufficient for the needs of the community, is located at the village. For a distance of about one-third of a mile from the wharf the bottom is bare at low tide so that vessels can approach and leave the wharf only at or near high water. The improvement desired is a channel about 100 feet wide and 6 feet deep at mean low water up to this wharf.

It appears that there are about 50 small summer cottages on the two points of land which mark the entrance to the inner harbor, and the improved channel is desired to accommodate the occupants of these cottages, as well as to encourage other business. During the summer a small steamboat visits the locality every day except Monday, its landing place being near the entrance to the inner harbor. It appears that there is little or no shipping except that conducted by this steamer. The district officer reports that the proposed channel would require excavation for more than half a mile. In view of the considerable amount of excavation necessary, including apparently more or less expensive ledge removal, and having in mind the unimportant traffic which it is desired to accommodate and which could be easily conducted by land, the district officer expresses the opinion that the public benefits would not be sufficient to justify the expenditure, and that Bluehill Inner Harbor is not worthy of improvement by the General Government. After consideration of the facts presented, the board joins the division engineer in concurring in this opinion.

Digitized by Google

No communications have been received from interested parties who were invited by the district officer to submit statements to the board. In compliance with law the board reports that there are no questions of water power, terminal facilities, or other related subjects which could be coordinated with the improvement of this locality in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 421.

ROCKLAND HARBOR, ME.

LETTER

FROM

THE SECRETARY OF WAR,

TRASMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION OF ROCKLAND HARBOR, ME.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and Ordered to be printed.

WAR DEPARTMENT,
Washington, January 9, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 8th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated September 30, 1911, of a preliminary examination of Rockland Harbor, Me., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON, *Secretary of War.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 8, 1912.

SIR: I have the honor to submit herewith for transmission to Congress, report dated September 30, 1911, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination of Rockland Harbor, Me., at and near Atlantic Point, called for by the river and harbor act of February 27, 1911.

Rockland Harbor has previously been improved by the United States by the construction of a large breakwater at the northeasterly

Digitized by Google

extremity of the harbor and by dredging and ledge excavation in the central and upper portions. It appears that the item directing this examination had in view the making of a channel up to a wharf in a cove near Atlantic Point for the benefit of a private company about to be organized. The district officer finds that the work would be very expensive as it would involve a considerable amount of ledge excavation and that general navigation would not be benefited. He therefore reports, and the division engineer concurs, that Rockland Harbor, Me., at and near Atlantic Point is not worthy of improvement by the General Government.

As required by law, this report has been referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated November 6, 1911.

After due consideration of the above-mentioned report, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Rockland Harbor, Me., at and near Atlantic Point, in the manner apparently desired by the interests concerned, as described in the report herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF ROCKLAND HARBOR, ME.

United States Engineer Office,
Portland, Me., September 30, 1911.

Sir: I have the honor to submit the following report on a preliminary examination of Rockland Harbor, Me., at and near Atlantic Point, directed by the river and harbor act approved February 27, 1911.

Rockland Harbor, Me., is a large, important harbor lying on the westerly side of the entrance to Penobscot Bay. The city of Rockland was reported in 1890 to have a population of 8,150. It is the terminus of a branch of the Maine Central Railroad, of a number of small steamboat lines plying to adjacent points, and has direct communication by steamer with Boston and Portland. It is a place of considerable commercial importance, chiefly through the operations of the granite and lime industries, which are extensive, and is the most important place in that section of the State. There are shipyards, extensive wharves, and other industries, beside which the locality has a recognized and great value as a harbor of refuge.

A project for improvement was adopted in 1880 and enlarged in 1896, under which about $920,000 have been expended in constructing a large and substantial breakwater 4,356 feet long at the northeasterly extremity of the harbor, in removing two groups of dangerous ledges lying about midway of the harbor, and in dredging along the harbor line in the central and upper portions of the harbor to depths of from 4 to 13 feet at mean low tide. All this work has been completed, and the breakwater having been established a number of years, it is probable that nothing further will need to be done

Digitized by Google

under the present project unless the breakwater should be damaged by storm.

The locality is shown on Coast Survey Chart No. 320, and more in detail on map attached to a report on a survey of Rockland Harbor, made in 1895, and printed as House Document No. 85, Fifty-fourth Congress, first session.

The river and harbor act of 1911 provides for a preliminary examination of Rockland Harbor at and near Atlantic Point. In investigating this matter I learned that the order for a prelimnary examination was inserted in the act at the request of a representative of the New England Portland Cement Co., of Rockland, Me., and that what is desired is a deepening of the cove southwestwardly of Atlantic Point. Nothing has ever been done by the National Government at that particular place. I addressed several letters to this concern, asking for information as to the grounds on which the request for an examination was based, and have been in correspondence with them to this end since the 24th of May last, and while the information has been promised me, it has not yet been received.

I visited the locality June 21 and saw the representative of the cement company. I saw other persons interested in the general development of the harbor and learned something as to the conditions. It appears that the cement company in question is in process of organization, but has not yet begun to operate nor is there any tangible evidence as to when they will. Near the head of the cove in question there is an old wharf formerly used as a cement works. It appears from correspondence with the Member of Congress from that district has sent to me, and from other sources, that the desire is that the cove on which the old cement wharf is located should be deepened by the Federal Government. The area immediately in front of the old cement wharf is bare at low tide, and the bottom, I judge from my own observation and the reports of others, is largely, if not wholly, ledge. While I have been able to secure no statement as to what depth is desired, it is evident that any project for excavation at that locality would be quite expensive, and that to justify such a project a very considerable benefit to commerce should be shown. No interest other than the projected cement company has expressed a desire for work at that locality. To undertake the rather extravagant proposition to excavate a navigable channel in to the old cement wharf would, in my judgment, not be justified by the rather intangible prospects now presented as a reason, and I am also very much in doubt as to whether such work would not take on the character of a subsidy for the private advantage of the cement company. It would seem to me that shipping facilities might be secured in a much less expensive manner than for the Government to rehabilitate the value of this old wharf at an expense probably much greater than the value of the wharf itself.

I have not investigated in detail the matter of wharfage accommodations in Rockland Harbor, for the reason that it is a matter of common knowledge that there is ample wharf room and that there has arisen no complaint that accommodation can not be readily secured. The wharves are for the most part without great depth, but this is due to the fact that ledge exists in such quantities that it would be impracticable to provide much greater depths than already exist except at prohibitive cost.

Digitized by Google

There are no questions of land reclamation or water-power development which have any bearing upon the desired improvement at the cove near Atlantic Point.

In view of the apparent great cost of the project, of the fact that the promotion of the business of the cement company has not reached a point where definite information can be shown, and of the further fact that the work desired is not for the benefit of general navigation, but is proposed for private interests, I am of the opinion that Rockland Harbor at and near Atlantic Point is not at this time worthy of improvement by the General Government.

Very respectfully,

W. E. CRAIGHILL,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

ENGINEER OFFICE, NORTHEAST DIVISION,
New York, N. Y., October 3, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 6, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The improvement sought here seems to be the dredging of a channel of approach to a wharf lying within the improved harbor of Rockland for the benefit of a private company not yet fully organized. No interest has been manifested in the improvement except by this company, and it appears that its ideas of what is wanted are rather vague.

The improvement would be expensive, as the material to be excavated is probably ledge rock; it is not needed in the interests of general commerce and navigation, and, in the opinion of the board, should not be undertaken by the General Government. It therefore concurs with the district officer and the division engineer in reporting Rockland Harbor, Me., at and near Atlantic Point, as unworthy of improvement at Federal expense.

No communications have been received from interested parties who were advised of the findings of the district officer and invited to submit statements and arguments to the board. There are no questions of terminal facilities, water power, or other subjects so related to the improvement proposed as to render it advisable in the interests of general commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 422.

ST. CROIX RIVER AT AFTON, MINN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF ST. CROIX RIVER AT AFTON, MINN.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed with illustration.

WAR DEPARTMENT,
Washington, January 9, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 8th instant, together with copy of a report from Maj. F. R. Shunk, Corps of Engineers, dated November 7, 1910, with map, of a preliminary examination of St. Croix River at Afton, Minn., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 8, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated November 7, 1910, with map, by Maj. F. R. Shunk, Corps of Engineers, on preliminary examination called for by the river and harbor act approved June 25, 1910, of St. Croix River at Afton, Minn.

Digitized by Google

The improvement desired is the dredging of certain shoals in front of the town of Afton for the purpose of permitting boats to land. The district officer states that deep water approaches to within 100 feet of the shore at the upper end of the town and that there are good depths close to the bank about one-fourth mile below the town. In the opinion of the district officer, what is needed is a good wharf, and he does not consider the improvement worthy of being undertaken by the United States. In this opinion the division engineer concurs.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated December 19, 1910, attention is invited. The board concurs with the district officer and the division engineer in the opinion that the improvement of this locality by the United States is not deemed advisable at the present time.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of St. Croix River at Afton, Minn., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF ST. CROIX RIVER AT AFTON, MINN.

United States Engineer Office,
St. Paul, Minn., November 7, 1910.

Sir: In compliance with letter of the Chief of Engineers dated August 4, 1910, I have the honor to submit a report of a preliminary examination of the St. Croix River at Afton, Minn., authorized by act of Congress approved June 25, 1910. No previous examination of this locality has ever been authorized by Congress, but an informal examination was directed by the Chief of Engineers under date of August 18, 1908, and report submitted September 25, 1908, to which I would respectfully invite attention. The present examination was made by Mr. Patrick F. Joyce, junior engineer, and was very complete. It is my opinion that this locality is not worthy of improvement by the United States.

Afton is a village of 400 population, situated on Lake St. Croix, opposite Catfish Bar, 11 miles south of Stillwater. A branch line of the Chicago, Milwaukee & St. Paul Railway, connecting Stillwater and Hastings, passes through the place, operating two trains a day each way, one of which is a passenger and the other a mixed train. The industries of the village are represented by three general stores, two blacksmith shops, a feed mill, a grain elevator, a lumber yard, and a hotel, while efforts are being made to start a creamery.

The surrounding country is fairly well populated, and a good portion of the people are engaged in dairy farming, the products of

Digitized by Google

which are brought to Afton for shipment. The freight on such shipments probably amounts to $25 per month. Afton is especially noted for its strawberries, though red and black raspberries and blackberries are also raised and shipped from here. This past season 2,300 crates (27,600 quarts) of strawberries were shipped from Afton by rail. But the railroad facilities are so poor that the greater part of the berry crop was carried to other shipping points and to St. Paul by team. Repeated requests made to the Chicago, Milwaukee & St. Paul Railway Co. for better facilities for handling the transportation of the berry crops have met with no result.

It is believed by the townspeople that, with a suitable harbor at Afton, all of this business could be handled to their satisfaction by boat. By this means they could get their perishable products, such as berries and garden stuff, to market at St. Paul, or to other shipping points more satisfactory than Afton, early in the day. Another reason advanced for the needs of a harbor is that summer residents, attracted to the shores of Lake St. Croix, discriminate against Afton as a source of supplies because of the difficulty of effecting a landing there, and patronize the stores at Lakeland and Hudson, located on opposite sides of Lake St. Croix, 4 miles north of Afton.

I inclose herewith a sketch showing soundings of the water front of Afton. It appears from this sketch that there is deep water—8 to 10 feet deep—within 100 feet of shore within the limits of the village and good depths close to the bank at a place about a quarter of a mile below the town. Nothing, in my opinion, is needed but terminal facilities such as ought not to be provided by the United States. The work of excavating a harbor, while it would not be very expensive, would cost far more than the commerce of this place would warrant; and if extended beyond the limits of the present deep water, as it would have to be, would need annual maintenance to an unknown but no doubt considerable extent. I can see nothing which would justify such work at Afton any more than at any other town of the same size on any river in Minnesota. I therefore do not think that this place is worthy of improvement by the United States, my reasons being that the commerce of Afton is extremely small; that the cost of the work would be out of proportion to the benefit conferred; and that the existing depths of water at Afton are ample for all the needs of the town. I would also invite attention to the fact that there is no traffic on the St. Croix River beyond the transportation of logs. The place could not, therefore, be a port of call for passenger or freight steamers, since there are none. The only commerce expected by the advocates of the improvement is the transportation of fruit, etc., in launches and other small boats during the summer season.

There are no public wharves at Afton, nor is there any public land available for terminal facilities. No questions of water power or flood control are involved in the desired improvement.

Respectfully submitted.

FRANCIS R. SHUNK,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

Digitized by Google

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., November 10, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer that St. Croix River at Afton, Minn., is not worthy of improvement by the United States.

W. L. FISK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 19, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

The existing project for the improvement of this river, reported as completed in 1900, provides for a channel depth of 8 feet from Taylors Falls to the Mississippi River, a distance of about 52 miles. The village of Afton is located on the improved reach at a point about 11 miles above the mouth. There is ample depth in the channel a few hundred feet from the shore, but a shoal extends along the greater part of the village front. At the upper end of the town deep water approaches the shore, needing only proper wharf facilities to become available for the commerce of the place. The district officer states that in his opinion nothing is needed but terminal facilities such as ought not to be provided by the United States.

The improvement desired is the removal of the above-mentioned shoal, so that boats may land and carry away fruits and berries, the principal products of the locality. There is at present practically no commerce on the river except the floating of logs.

Interested parties were notified of the district officer's adverse report, and on December 12, 1910, Hon. F. C. Stevens, M. C., appeared before the board in advocacy of the improvement and presented a petition signed by a number of residents of the locality.

In view of the conditions outlined above, the board concurs in the opinion of the district officer and the division engineer that this locality is not worthy of improvement.

The district officer states that there are no wharves or terminal facilities, and the board reports in compliance with the provisions of the act of June 25, 1910, that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

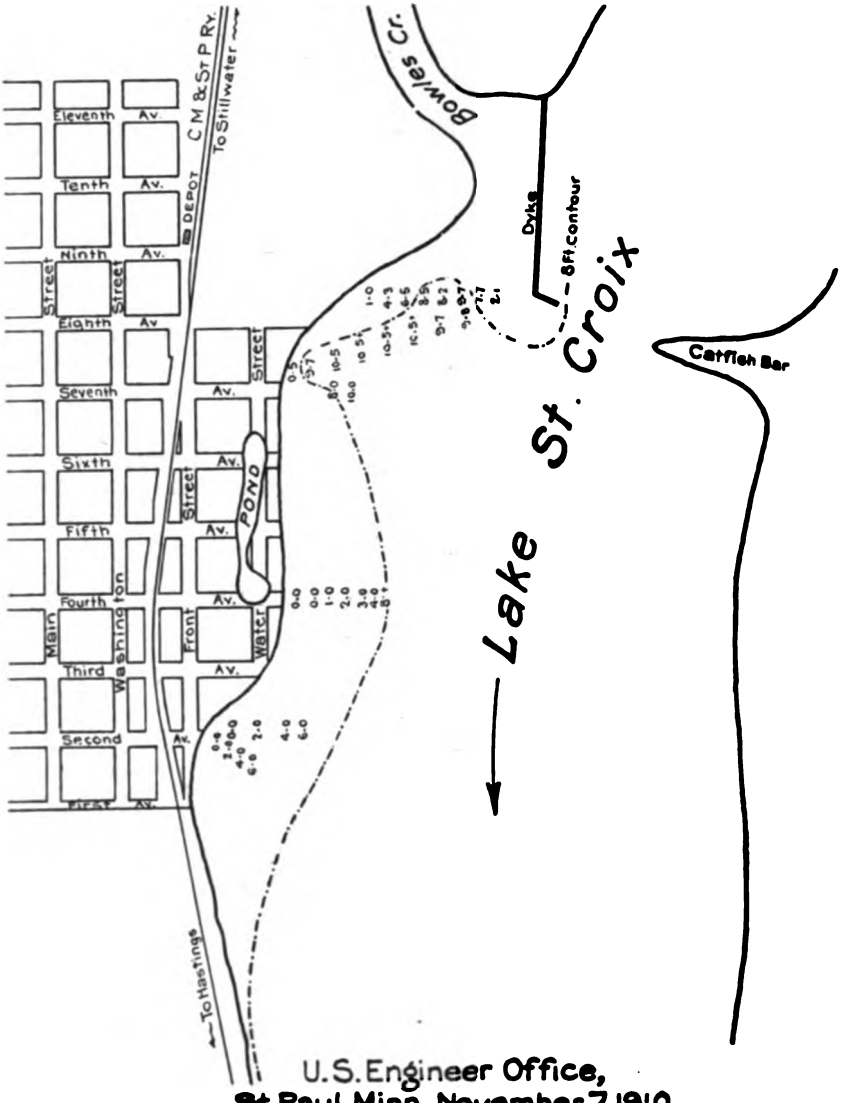
WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

Digitized by Google

AFTON, MINNESOTA.

SCALE OF FEET

1000 500 0 1000 2000 3000 4000



U.S. Engineer Office,
St. Paul, Minn., November 7, 1910.

To accompany report of this date to the Chief of Engineers, U.S.A.

Major, Corps of Engineers.

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 423.

KENNEBUNK RIVER, ME.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF KENNEBUNK RIVER, ME.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated March 22, 1911, of a preliminary examination of Kennebunk River, Me., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated March 22, 1911, by Lieut. Col. W. E. Craighill, Corps of Engineers, on a preliminary examination of Kennebunk River, Me., made in pursuance of act of Congress approved June 25, 1910.

Digitized by Google

This river has previously been improved by the General Government a depth of 4 feet at mean low water, or about 13 feet at high water, having been secured as far as the bridge at Kennebunkport, Me., about 1 mile from the mouth. In the opinion of the district officer the improvement already made is sufficient to meet the demands of present and reasonably prospective commerce, and no further improvement, beyond maintenance of the existing works, for which an allotment has been made, is now necessary. The division engineer concurs in the opinion of the district officer.

As required by law, this report has been referred to the Board of Engineers for Rivers and Harbors and attention is invited to its report herewith, dated April 17, 1911, expressing concurrence in the opinion of the district officer and division engineer that Kennebunk River is not worthy of improvement beyond maintenance of the existing project.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Kennebunk River, Me., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF KENNEBUNK RIVER, ME.

United States Engineer Office,
Portland, Me., March 22, 1911.

Sir: I have the honor to submit the following report on a preliminary examination of Kennebunk River, Me., made under the requirements of the river and harbor act of June 25, 1910.

Physical characteristics.—Kennebunk River lies in York County, Me., and flows southeasterly about 15 miles to the Atlantic Ocean. Its mouth is about 25 miles west of Portland. The drainage area is about 65 square miles. The only village of any importance on the river is Kennebunkport, near the mouth. Crossing the river, in the upper part of this town, there is a causeway which has a draw span with an opening of 46 feet, but all the navigation except small pleasure craft is confined to that part of the river, about 1 mile in extent, which is below the bridge. Near the mouth of the river there are several large summer hotels, and the locality is a favorite summer resort for people of means. On this account in the summer time there are many yachts and pleasure craft in the river.

Historical.—The public improvement of the Kennebunk River was begun in 1798 by the State of Massachusetts. The first appropriation by Congress was made in 1829. The river was surveyed in 1874, again in 1878 under direction of Lieut. Col. George Thom, Corps of Engineers, and in 1889 under direction of Lieut. Col. Jared Smith, Corps of Engineers. The last survey report is contained in House Document No. 136, Fifty-first Congress, first session (Report of the

Digitized by Google

Chief of Engineers, 1890, pt. 1, p. 473). The recommendations of the last report included repairs and improvements to the existing works at an estimated cost of $20,000. This amount was appropriated September 19, 1890. The object of the improvement was to obtain a depth of 4 feet at mean low water or about 13 feet at high water, as far as the bridge at Kennebunkport. The improvements have consisted, besides some dredging in the river, of two stone jetties at the mouth, a jetty on the left bank near the mouth with a short training wall at its head, and a pier or wharf which serves the double purpose of bank protection and wharf for vessels to moor to, instead of anchoring in the channel, there being no other available anchorage space. These works have fallen into disrepair, and an allotment has been made for their repair, except for the wharf, which it is not thought necessary to preserve except as a bank protection.

Commercial statistics.—In former times the business of the port was considerable, and there were some small vessels built in two shipyards above the bridge. These are now practically abandoned and the only business of the port consists in coal brought for local consumption, with an occasional cargo of lumber, and of iron pipe for use by the local water company. There is a brickyard and a granite quarry above the bridge, but their products are shipped by rail exclusively. A few fishing boats come into the river with fish for local consumption or for shipment to market by rail. The amount of coal brought in annually is about 2,240 tons (2,000 pounds). The average rate of freight on coal from New Jersey points in 1909 was 95 cents per short ton. A fleet of over 400 small craft is maintained on the river in summer for pleasure purposes. In addition, many large yachts cruising along the coast or from neighboring resorts come into the river in summer. There is reported to be now somewhat less than the project depth in the river. It is claimed that further development of business on the river is retarded by lack of further improvement, but I am of the opinion that improvement by the General Government beyond maintaining what has already been done is not justified by the amount of business involved or likely to be developed.

Wharf and terminal facilities.—All the wharves for commercial purposes are within a short distance below the bridge. On the left bank there are four wharves in good repair, the principal one immediately below the bridge being owned and used by the local coal company for the discharge and storage of coal. On the west side of the river there is the terminus of a branch of the Boston & Maine Railroad occupying the water front for about 700 feet. In this stretch there are two wharves, built by the railroad for the purpose of bringing in coal, but they are no longer used for this purpose. Below there are various wharves and landings for yachts and small boats, including the clubhouse and landing pier of the Kennebunk Boat Club. None of the wharves are equipped with machinery for handling freight, and there are no terminal facilities owned by individuals or corporations that are extended to all on equal terms. There are no terminal facilities for the transfer of freight between the land and the water routes, except the railroad wharves, which are not used. There is, however, public space on the east side of the river owned by the town, which is available for the construction

Digitized by Google

of public wharves. There are no regular lines of boats running to the Kennebunk River.

There are no questions of land reclamation, flood control, or water-power development to be considered in connection with the improvement of the river for navigation purposes.

Very respectfully, W. E. CRAIGHILL,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, March 24, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district engineer officer that the Kennebunk River is not worthy of further improvement by the General Government.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, April 17, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The navigable portion of this river, except for small pleasure craft, is limited to the part below the bridge at the village of Kennebunkport, a stretch about 1 mile in length. Small expenditures have been made on the improvement of this river since 1798, at which time work was undertaken by the State of Massachusetts. The amount expended by the State is not known. Improvement by the United States was undertaken in 1829, since which time $85,175 has been appropriated and expended on this stream. Jetties were constructed at the mouth, and some pier, jetty, and dredging work done within the river. The project contemplated a depth of 4 feet at mean low water or about 13 feet at high water as far as the bridge at Kennebunkport.

In a report submitted in 1890, the district officer stated that "the improvement already made seems to me to be as great as the business and commerce of the place justify. It does not, however, appear to be good policy to permit the works already built to become ruined from lack of care and repairs. The channel proper of the river does not appear at present to require any attention. It would seem that such repairs or reconstruction of works already built as may be needed to maintain them in good condition should be carried out."

Following this recommendation, $20,000 was appropriated and expended, the last work being done in 1892. It is stated within that the depth is now slightly less than the projected depth and that the works are in a state of disrepair, but that an allotment has been made for their restoration, except for the wharf, which it is not thought necessary to preserve except as a bank protection. There has never been a large commerce on this stream and the district

Digitized by Google

officer reports that at present it consists principally of about 2,240 tons of coal. A few fishing boats come into the river with fish for local consumption or for shipment by rail, and an occasional barge load of lumber and iron is brought in. There are a number of pleasure craft maintained on the river in the summer time, this being a well-known summer resort.

The district officer expresses the opinion that the river is not worthy of improvement by the General Government beyond the maintenance of the work already done, believing that the present business or that which is likely to develop would not justify further improvement. In this view the division engineer concurs. Interested persons were advised of the district officer's unfavorable report and given an opportunity of presenting their views to the board, but no communications on this subject have been received. It seems apparent that no great commerce can be expected on this river and that its principal use will be for pleasure boats. In view of all the facts, the board concurs in the opinion of the district officer and the division engineer that Kennebunk River is not worthy of improvement beyond the maintenance of the existing project.

The district officer describes existing wharves, and in compliance with law the board reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 424.

CHOCTAWHATCHEE BAY, FLA.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF CHOCTAWHATCHEE BAY, FLA., WITH A VIEW TO SECURING A DEEPER CHANNEL TO THE GULF OF MEXICO.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. G. D. Fitch, Corps of Engineers, dated June 12, 1911, of a preliminary examination of Choctawhatchee Bay, Fla., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated June 12, 1911, by Lieut. Col. G. D. Fitch, Corps of Engineers, on preliminary examination of Choctawhatchee Bay, Fla., with a view to securing a deeper channel to the Gulf of Mexico, called for by the river and harbor act approved June 25, 1910.

Choctawhatchee Bay is about 27 miles in length, and 3 to 5 miles in width, has sufficient depth for handling of commerce, and is well protected from storms. The entrance thereto is through East Pass,

Digitized by Google

located about 45 miles east of the entrance to Pensacola Harbor, and about 55 miles west of St. Andrews Bay, Fla. This pass is narrow, the channel crooked, shallow, and shifting, and several years ago had a depth of 11 feet, but shoaling has reduced the depth to 6 feet. The commerce of the bay now goes to Pensacola through Santa Rosa Sound, and being the natural distributing point, the district officer reports that commerce would probably continue to go to Pensacola, even if East Pass were improved; also that the improvement and maintenance of East Pass would be very expensive, and in his opinion the locality is not worthy of improvement by the General Government.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report, herewith, dated August 1, 1911, concurring in the views of the district officer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Choctawhatchee Bay, with a view to securing a deeper channel to the Gulf of Mexico, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF CHOCTAWHATCHEE BAY, FLA.

UNITED STATES ENGINEER OFFICE,
Montgomery, Ala., June 12, 1911.

SIR: In compliance with department letter of August 4, 1910, I have the honor to submit the following report upon a preliminary examination of "Choctawhatchee Bay, with a view to securing a deeper channel to the Gulf of Mexico," as provided for by the act of Congress approved June 25, 1910.

The entrance to Choctawhatchee Bay from the Gulf of Mexico is through East Pass, a narrow, crooked, shallow, and exposed channel of about 6 feet depth. The bay itself has sufficient area and depth for its commerce, and is well protected from storms. There are no towns, nor is there any agricultural land on Choctawhatchee Bay. Several sawmills are located there, however, and the product of these mills, as well as the commerce of the Choctawhatchee River, is taken to Pensacola via Santa Rosa Sound. The lumber business on Choctawhatchee Bay is declining and the improvement of East Pass would be of no value to the commerce of the Choctawhatchee River which, consisting mainly of naval stores, would not be diverted, but would continue to go to Pensacola as a distributing point.

There are no wharves, no terminal facilities, and no mechanical appliances for handling freight on the bay; the future necessities, if there ever should be any, are at this time impossible to estimate.

Attention is respectfully invited to the inclosed report of Assistant Engineer J. E. Turtle, also to the various letters received concerning the commerce of Choctawhatchee Bay.

Digitized by Google

In conclusion, I would state that the improvement of East Pass would be very expensive and its maintenance difficult, and that, in my opinion, Choctawhatchee Bay is not at present worthy of improvement by the General Government.

Very respectfully,

G. D. FITCH,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 1, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Choctawhatchee Bay is about 27 miles in length and 3 to 5 miles in width. It has ample depth for all the commerce that may be expected to use it. It is separated from the Gulf of Mexico by a narrow neck of land through which there is an entrance to the bay having a depth at present of about 6 feet. The improvement desired is believed to to be the deepening of this entrance.

The commerce of Choctawhatchee Bay and of the river of the same name which empties into the eastern end of the bay, consists principally of timber and its products. This commerce is now carried through Santa Rosa Sound in light-draft vessels to Pensacola, the natural market and the point to which it would go if the improvement contemplated were carried into effect, unless a safe entrance for deep-draft ocean vessels were provided, in which event some of the products might be shipped direct to eastern or foreign markets.

The physical conditions indicate that a ship-channel entrance would be expensive to construct and also to maintain. It seems evident that the benefits to accrue to the commerce of this locality would not be sufficient to justify the cost of a deep-harbor entrance, and one for light-draft vessels is not required and would not be used.

In view of the facts stated above, the board concurs with the district officer in the opinion that Choctawhatchee Bay is not worthy of improvement by the General Government.

Interested parties were notified of the district officer's unfavorable report and invited to submit statements to the board, but no communications in behalf of the improvement have been received. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects that have any bearing upon the improvement of this locality in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Report of Assistant Engineer J. E. Turtle.]

WARRINGTON, FLA., *May 10, 1911.*

SIR: I have the honor to submit the following report upon the preliminary examination of Choctawhatchee Bay, with a view to securing a deeper channel to the Gulf of Mexico:

The entrance from Choctawhatchee Bay to the Gulf is through East Pass, located 45 miles east of the entrance to Pensacola Harbor, and about 55 miles west of the

Digitized by Google

entrance to St. Andrews Bay. East Pass entrance is narrow, the channel crooked, shallow, and shifting, having at the present time about 6 feet of water. The location is exposed, the bars indicating that the travel of sand at this locality is from both the east and west. Several years ago the channel depth through East Pass was 11 feet, but it has since changed location and shoaled to 6 feet.

Choctawhatchee Bay is a wide expanse of water, having sufficient area and depth for the handling of commerce, and is well protected from storms. A river of the same name flows into its most eastern end, which, with the Holmes River, carries the year round a fairly profitable commerce. Upon the bay are located several sawmills of fair capacity. The product of these mills, as well as the commerce of the Choctawhatchee River, is now brought to Pensacola, the greatest distance being about 40 miles. The chief articles of the river traffic consist of naval stores, which, irrespective of the depth of East Pass, would have to come to Pensacola, since the latter is a distributing point. The upstream freight being supplies, would likewise bring the boats to Pensacola. There are no towns on Choctawhatchee Bay, nor are the bordering lands agricultural.

Increased facilities for the handling and shipment of lumber are not, strictly speaking, a public benefit; they rather enhance the manufactures, which generally are a few. In other words, it is not always a strong argument for the improvement by the General Government. The manufacturing of lumber on Choctawhatchee Bay is much less now than it was years ago, and will probably never be again what it has been. This is due to reasons other than lack of better facilities.

The improvement of East Pass would in no manner divert or convenience the traffic of the Choctawhatchee River.

The order in the preliminary examination mentions "to secure a deeper channel to the Gulf of Mexico"; this is very indefinite, but must mean at least a depth sufficient for coastwise commerce. Such improvement would be very expensive and the maintenance within reasonable limits questionable.

I consider the improvement of East Pass, under the existing conditions, unworthy of consideration by the General Government, and recommend that no survey with this object in view be made.

There are no wharves, no terminal facilities, or mechanical appliances for handling freight. The future necessities are at this time impossible to estimate—probably there will never be any.

Very respectfully,

J. E. TURTLE,
Assistant Engineer.

Lieut. Col. G. D. FITCH,
Corps of Engineers.

[Letter of the J. J. McCaskill Co.]

FREEPORT, FLA., *September 8, 1910.*

DEAR SIR: Replying to your letter of August 26 relative to the commerce of Choctawhatchee Bay district, we beg to submit what we believe to be a conservative estimate of the bay traffic, compiled recently by Mr. John J. MacIntire, who has made a close study of traffic conditions of this locality.

	Output.	Tons.	Value.
LUMBER.	*Feet.*		
McCaskill Mills	12,000,000	24,000	$420,000
Graves Tatom Mills	12,000,000	24,000	300,000
Gulf Lumber Co	6,200,000	12,400	111,600
McKenzie Mills	9,500,000	19,000	237,500
Kelly Lumber Co	4,200,000	8,400	75,600
Square timber from up-river mills	5,750,000	11,500	143,750
Steamer and tar wood (7,800 cords)	.....	11,700	19,500
	49,650,000	111,000	1,207,950
NAVAL STORES.	*Barrels.*		
Turpentine	9,780	2,445	293,400
Rosin	29,340	7,335	234,720
	39,120	9,780	528,120

Digitized by Google

The cost per thousand to move lumber by present light-draft vessels that can navigate Santa Rosa Sound to reach seagoing vessels at Pensacola is $1.50 per thousand.

All lumber from this locality is for export, and the tax on producers is $74,475. The freight on naval stores is $1 per ton, a tax of $9,780, or a total tax of $84,255.

A cut through the peninsula at Horseshoe Bayou admitting seagoing vessels to the bay will save shippers 70 per cent of present tax, or $59,000 annually. Six steamers, eight towboats, and numerous schooners and barges navigate bay waters regularly, carrying lumber, timber, naval stores, machinery, provisions, and general merchandise.

Tonnage of Choctawhatchee Bay.

	Tons.
Lumber	111,000
Naval stores	9,780
General merchandise	25,500
Total	146,280
Value of traffic per annum	$2,366,070

Yours, truly,

THE J. J. MCCASKILL CO.,
By R. E. MCCASKILL,
Secretary and Treasurer.

Capt. H. B. FERGUSON,
Corps of Engineers.

[Letter of Southern States Lumber Co.]

PENSACOLA, FLA., *August 27, 1910.*

DEAR SIR: Replying to your inquiry of the 26th instant, will say that the business of our company is all west of Pensacola Bay and we are unable to give any information as to the value and character of commerce that would result from the deepening of the channel from Choctawhatchee Bay to the Gulf. We would like, however, to see the proposed improvements made, as same would materially assist in developing the undoubtedly rich resources of the Choctawhatchee region.

Respectfully, P. K. YONGE, *Manager.*

Capt. H. B. FERGUSON,
Corps of Engineers.

[Letter of the Geneva Transportation Co. (Inc.).]

GENEVA, ALA., *August 27, 1910.*

DEAR SIR: Your esteemed favor of the 26th instant to hand and noted, and has been turned over to our secretary for more complete answer. The writer has been on the river here since 1874, and has had a long experience on the river, and believe that I am as thoroughly posted as to the needs of the river as anyone. I am familiar with the country from the head to the mouth of the river and its tributaries. The most of the pine timber has been cut, and the land is being put into farms; the country from the Louisville & Nashville Railroad to Pensacola is dependent on the boats for their freight. If the river was put in good shape so that the boats could make regular trips it would be a great inducement for settlers to come into the country, and would largely enhance the value of the lands in that portion of the State. Then there is millions of hardwood all along the swamps that can not be got to market in any other way. I think we ought to have at least $25,000 on that river next year, then afterwards it would not take so much. I think that we should have for the first year, if possible, three snagboats and one or two boats to go ahead and remove all overhanging timber and such snags as they could handle. One boat perhaps could do this last.

If at any time either you or any of your engineers should desire to make the trip over the river, we would take pleasure in placing a boat or launch at your disposal to make the trip.

Respectfully, yours, THE GENEVA TRANSPORTATION CO.,
Per F. J. WHITE.

Capt. H. B. FERGUSON,
Corps of Engineers

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 425.

COREA HARBOR, GOULDSBORO, ME.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF COREA HARBOR, ME.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated August 14, 1911, of a preliminary examination of Corea Harbor, Gouldsboro, Me., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated August 14, 1911, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination of Corea Harbor, Gouldsboro, Me., called for by the river and harbor act approved June 25, 1910.

Corea Harbor is located at the southeasterly extremity of the town of Gouldsboro, about 12 miles east of Bar Harbor, Me., and is shown on Coast Survey Chart No. 305 as "Indian Harbor." It is a very

Digitized by Google

small harbor with a depth of 5 feet. Interested parties desire that it be deepened by the United States to 6 feet at mean low tide. The district officer reports that the interests involved are so small the resulting benefits would not justify the cost of necessary work. The division engineer concurs in this opinion.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report, herewith, dated September 18, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Corea Harbor, Gouldsboro, Me., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF COREA HARBOR, ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 14, 1911.

SIR: I have the honor to submit the following report on a preliminary examination of Corea Harbor, Gouldsboro, Me., directed by the river and harbor act approved June 25, 1910.

Corea Harbor is at the southeasterly extremity of the town of Gouldsboro, also the southeastern extremity of Hancock County, Me. It is about 12 miles east of Bar Harbor, measured in a direct line, and about 8 miles east of Winter Harbor. To reach a railroad station involves driving to Winter Harbor and thence by boat to Bar Harbor, or a drive of about 15 miles to Sullivan. The settlement at Corea is said to have a population of about 190. The locality is shown on Coast Survey Chart No. 305, on which it bears the name "Indian Harbor." There is a post office located there.

I visited this locality June 22, 1911, and saw Mr. Emery P. Parker, who is a wholesale dealer in dry and pickled fish. The same day I interviewed also Hon. Bedford E. Tracy, of Winter Harbor, with whom I have had some correspondence on the subject of the desired improvement at Corea.

The only business in the way of shipping fish at this place is conducted from a single small wharf and fish house, the property of Mr. Parker, located at the head of a very small cove on the westerly side of the harbor. Mr. Parker's wharf is about 50 feet front and about 30 feet deep to the shore. The fish house or shed occupies nearly the entire surface of the wharf. His business consists in drying, curing, and shipping fish brought to him by local fishermen. There is also a considerable business in shipping lobsters. It has been stated that there are from 25 to 35 sailing and motor fishing vessels and boats.

Digitized by Google

some of which are engaged in lobster fishing, owned by residents of the locality, and that these boats anchor in the harbor, thereby obstructing passage.

Mr. Parker stated that the value of freight in and out of the harbor amounted to about $50,000 annually, and in quantity to about 700 tons.

In the harbor, which is very small, there is a depth of about 5 feet. In the small cove where the fish wharf is located it is bare at low tide. Mr Parker stated that if 6 feet at mean-low tide could be secured it would enable more business to be done and avoid delay. He did not claim that there would be a reduction in freight rates.

There are no questions of land reclamation or water-power development in any of their aspects to be considered in connection with this locality, nor are there any wharves worthy of the name except the one belonging to Mr. Parker, which is devoted to his private business of curing and shipping fish. I do not know the value of Mr. Parker's wharf, but I would suppose that it might be duplicated possibly for $2,000. No dredging, even were no ledge encountered, having any practical value could be accomplished for a sum less than several times the value of the wharf and fish house, so that it would be more economical to move the wharf out to some place where there is better water than to attempt to bring deeper water to the wharf. Land is cheap, and the securing of a better site should be a matter of no particular difficulty.

In view of what I have learned of this locality, both from correspondence and from personal observation, it is my opinion that the improvement of Corea Harbor is not justified and, therefore, that the locality is not worthy of improvement by the General Government.

Very respectfully,

W. E. CRAIGHILL,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, N. Y., August 17, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 18, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This locality is shown on Coast Chart No. 305, on which it bears the name "Indian Harbor." In the harbor, which is very small, there is a depth of about 5 feet. In a small cove there is one wharf, on which is a fish house. These structures are used by the owner in

Digitized by Google

connection with his business of drying, curing, and shipping fish brought to him by local fishermen. It is reported that about 25 to 35 fishing vessels and boats anchor in the harbor. The improvement desired is a depth of 6 feet at mean low water. This improvement could not be expected to have any effect on freight rates and its value would be practically limited to facilitating the business of the owner of the single wharf mentioned.

After consideration of the matter the board believes that commensurate benefits of a public nature could not be expected from the suggested improvement, and it therefore concurs with the district officer and division engineer in the opinion that this locality is not worthy of improvement by the General Government.

No communications have been received from interested parties who were notified of the district officer's unfavorable report and invited to submit statements to the board. In compliance with law the board reports that there are no questions of water power, terminal facilities, or other related subjects which could be coordinated with the improvement of this locality in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 426.

MOUNT SINAI HARBOR, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF MOUNT SINAI HARBOR, N. Y.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 9, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 8th instant, together with copy of a report from Col. S. W. Roessler, Corps of Engineers, dated August 18, 1911, of a preliminary examination of Mount Sinai Harbor, N. Y., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 8, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated August 18, 1911, by Col. S. W. Roessler, Corps of Engineers, on preliminary examination of Mount Sinai Harbor, N. Y., called for by the river and harbor act approved June 25, 1910.

Mount Sinai Harbor is a small and shallow harbor on the north shore of Long Island, about 50 miles east of New York City and 3 miles from the harbor of Port Jefferson, which is being improved at national expense. Under authority of the General Government the Brookhaven Sand & Gravel Co. dredged a channel through the harbor for its own use to a depth of about 10 feet. This channel has

Digitized by Google

shoaled to the original depth of about 3 feet at mean low water at the entrance, and the business of the sand company has been suspended. Aside from the activities of this company there is no commercial traffic in the harbor. The improvement desired is understood to be the restoration and maintenance of the channel at the entrance by the United States. The district officer reports that the resulting public benefits would not justify the cost of necessary work. The division engineer concurs in this opinion.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated September 18, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Mount Sinai Harbor, N. Y., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF MOUNT SINAI HARBOR, N. Y.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New York City, August 18, 1911.

SIR: I have the honor to submit the following report of a preliminary examination of Mount Sinai Harbor, N. Y., authorized by the river and harbor act approved June 25, 1910.

The locality was visited by Mr. Babcock, assistant engineer, Mr. Kerr, junior engineer, both of this office, and by myself, on the 15th of August, 1911. Mr. G. C. Tooker, postmaster of the village of Mount Sinai, and Mr. E. C. Willets, a landowner and summer resident on the bay, accompanied us on the trip of inspection.

Mount Sinai Harbor is an indentation in the north shore of Long Island, near the middle point of the island. The nearest harbor under improvement by the National Government is that of Port Jefferson 3 miles to the westward. The nearest railway station is that of the village of Port Jefferson on the Wading River branch of the Long Island Railroad, distant 59 miles from New York City.

In shape the harbor is semielliptical, with a distance of about 1¼ miles between the headlands and a depth of 1 mile to the head of the bay. The bay is surrounded by a high rolling country of sand and gravel formation. Originally occupied by a farming community, it is now being subdivided and developed as a summering place. A large number of cottages have already been constructed.

Starting at the easterly headland, a sand and gravel spur called East Beach extends westerly across the opening of the bay and a

Digitized by Google

farther distance of about one-fourth mile overlapping the western headland. The existing channel at the entrance to Mount Sinai Harbor is between the end of this spur and the western headland. Inside of East Beach is a grassy salt marsh, about one-half mile in width, through which meander a number of tidal sloughs. The harbor proper is a comparatively small area, and is very shallow, the greater portion of the bottom being exposed at low tide. The position of the harbor in relation to the adjoining harbor of Port Jefferson and the character of the country surrounding is well illustrated on Setauket Quadrangle, Suffolk County, N. Y., United States Geological Survey, copy of which is herewith.[1]

The Brookhaven Sand & Gravel Co., of 24 State Street, New York City, owns 30 acres of sand and gravel bank at the head of the bay. Development of a sand and gravel business in connection with a line of barges to convey the materials to New York City was commenced in 1910 by the construction of a pile trestle and wharf at the extreme head of the bay. Lacking sufficient water at the entrance and in the channel of the bay, the company received permission to do necessary dredging under authority of the Assistant Secretary of War, dated June 6, 1910. Under this authority dredging was done both at the entrance and in the harbor, and a channel of about 10 feet depth was created. The dredged channel within the harbor has probably been well maintained, but has rapidly shoaled at the entrance proper, where the dredged depth of 10 feet was rapidly reduced within a period of a few months to the original depth of about 3 feet at mean low water. The effect of this shoaling has been to cause a suspension of the activities of the Brookhaven Sand & Gravel Co. It is understood that the company expended many thousands of dollars in the dredging which it has done and that the company is now in financial difficulties.

The purpose of the examination was to obtain the approval of a project by the Government for again deepening and maintaining the channel at the entrance. Aside from the business of the sand and gravel company above mentioned, there is no commerical traffic in the harbor.

In view of the foregoing and of the fact that the adjoining harbor of Port Jefferson, only 3 miles away, has been improved and is being maintained by the General Government in the interests of general commerce seeking this part of the island, I am of the opinion that Mount Sinai Harbor is not worthy of improvement by the General Government.

Transfer facilities are as above stated. Being tidal waters there are no questions of water power involved.

Very respectfully,

S. W. Roessler,
Colonel, Corps of Engineers.

The Chief of Engineers, United States Army.
(Through the Division Engineer).

---

[1] Not printed.

Digitized by Google

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, August 23, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 18, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This is a small and shallow harbor on the north shore of Long Island, about 50 miles east of New York City and 3 miles from the harbor of Port Jefferson, which is being improved at national expense.

Under authority of the General Government, the Brookhaven Sand & Gravel Co. dredged a channel through the harbor for its own use to a depth of about 10 feet. This channel has shoaled to the original depth of about 3 feet at mean low water at the entrance, and the business of the sand company has been suspended. Aside from the activities of this company there is no commercial traffic in the harbor.

The improvement desired is understood to be the restoration and maintenance of the channel at the entrance by the United States. In view of the limited interests to be affected and the close proximity of a fair harbor now under improvement, the district officer and the division engineer are of opinion that Mount Sinai Harbor is not worthy of improvement by the General Government. In this view the board concurs.

No communications have been received by the board in response to the district officer's notification of his unfavorable report. There are no questions of terminal facilities, water power or other subjects that have any bearing upon the improvement under consideration.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Member.

O

Digitized by Google

62D CONGRESS, 2d Session. | HOUSE OF REPRESENTATIVES. | DOCUMENT No. 427.

LITTLE NECK BAY, N. Y.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF LITTLE NECK BAY, N. Y.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Col. S. W. Roessler, Corps of Engineers, dated June 22, 1911, of a preliminary examination of Little Neck Bay, N. Y., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated June 22, 1911, by Col. S. W. Roessler, Corps of Engineers, on preliminary examination of Little Neck Bay, N. Y., made in pursuance of the river and harbor act approved June 25, 1910.

Little Neck Bay is located on the north shore of Long Island, between the headlands of Willets Point and Great Neck, about 17 miles from the Battery and, excepting the northeast quarter thereof, lies within the limits of Greater New York. At the inner end of the bay

Digitized by Google

is a salt marsh through which a tortuous slough or creek meanders, in the vicinity of which are located a few industrial plants. The improvement desired by interested parties is a channel way through the shallow upper bay into the creek, and incidentally the widening of the draws in the railroad and highway bridges over the creek. The district officer reports that the present and prospective commerce is small and, in his opinion, the resulting benefits would not justify the cost of necessary work. The division engineer concurs in this opinion.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated August 2, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Little Neck Bay, N. Y., in the manner apparently desired by the interests concerned as described in the reports herewith is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF LITTLE NECK BAY, N. Y.

War Department,
United States Engineer Office,
New York City, June 22, 1911.

Sir: I have the honor to submit the following report upon a preliminary examination of Little Neck Bay, N. Y., made in pursuance of the river and harbor act approved June 25, 1910. The district engineer has inspected the locality in company with Mr. Henry N. Babcock, assistant engineer; Mr. H. T. Kerr, junior engineer; Mr. Julius Harder, president of the Civic Association of Bayside; and Mr. Charles G. Meyer, who is interested in a water supply pumping station near the head of the bay.

Little Neck Bay is an indentation in the north shore of Long Island, between the headlands of Willets Point and Great Neck, distant about 17 miles from the Battery, New York City. The bay is about 2 miles long and 1 mile broad. All of it except the northeast quarter lies within the limits of Greater New York. The location is clearly shown in United States Coast and Geodetic Survey Chart No. 120.

The bay is a very shallow body of water, the depths ranging from 7 to 10 feet at low tide in the lower portion, thence decreasing to nothing at the upper end. The average rise and fall of the tide is 7.2 feet, permitting vessels drawing 6 to 7 feet to go to the head of the bay at the top of the tide. In the shallower portions the bottom is soft mud. Some years ago the bay produced a large number of shellfish. Of late years this industry has not been of much importance.

Digitized by Google

At the head of the bay is a salt marsh, about three-fifths of a mile wide and three-fifths of a mile long, through which meanders a tortuous tidal slough, which fills and empties with the tide. The only navigation of the locality, except the fishing and pleasure boats in the deeper water of the bay, is carried through this slough in vessels not over 66 feet in length and 25 feet beam and drawing from 5 to 6 feet of water. The creek is crossed by the bridge of the Port Washington Branch of the Long Island Railroad, and a quarter of a mile farther up by the highway bridge over which a trolley line passes. Both bridges have draws with a free navigable width of 29 feet and 28 feet, respectively.

The improvement desired is the deepening and straightening of the channel to and up the creek and incidentally the widening of draws in the railroad and highway bridges.

The industries most interested in the navigation to the head of the bay and through the slough in question are three in number: First, the Citizens' Water Supply Co., which has a number of driven wells at the head of the marsh, and which, in connection with other similar plants elsewhere, supplies a considerable portion of the northeastern part of the Borough of Queens which is not supplied by the municipal system. This company used 6,570 tons of coal the past year. Second, the Sweezey Lumber & Coal Co., doing a general supply business, with landing in the vicinity of the highway and trolley road crossing. Its receipts of coal amount to about 7,000 tons annually. Third, the New York & North Shore Traction Co., which has erected a power plant just below the railroad bridge and which uses about 3,000 tons of coal annually. The city also receives gravel and stone ballast for construction and repair of roads. The other principal materials received at this point are lumber, pipe, brick, lime, and cement. The tonnage is estimated at 36,820 tons, of which 45 per cent, or 16,570 tons, is carried by water, 50 per cent, or 18,410 tons, by rail, and 5 per cent, or 1,840 tons, by carts. Occasionally light-draft sailing vessels come in, but usually the material is brought in scows and barges, which average about five a week during the open season of 40 weeks or more a year.

There are no wharves and landings under the control of public authorities. There are three wharves where coal is received; one at the trolley car house, one near the highway bridge, and a third still farther up the stream where coal for general domestic uses is delivered. Another landing is being built near the highway bridge in connection with a recently established yard for building materials. Two of the above-mentioned landings are open to public use upon payment of a charge. All of them are in that part of the stream which is practically bare at low tide, and can be reached by vessel only at times of high tide. Barges of 5 to 6 feet draft used in the navigation of the slough carry from 100 to 150 tons of material.

There is no established freight or passenger line by water to the head of Little Neck Bay. There is no manufacturing of any consequence in the locality, and no apparent prospect of any in the near future. Any growth that may take place in the existing commerce will result more probably from building operations in this rapidly growing section than from any other cause. The shores of the bay, except in the immediate vicinity of the marshland above referred to are abrupt, rising rapidly from the high-water line, and furnish admirable sites for summer residences. The shores have been occupied

Digitized by Google

for a great many years by people of means, who have built handsome residences, especially along the Great Neck shore, where valuable estates are to be found. Upon the hilly slopes back of the marshlands residences are springing up with surprising rapidity. It is safe to assume that the residential section surrounding the bay, especially the wealthier part of it along the water front, is opposed to the development of commercial and manufacturing industries so near their doors, and if consulted would protest against any improvements that would tend to encourage such developments.

The water-borne traffic which would be benefited by an improvement of the locality is practically all incoming freight intended for local distribution to the several industrial plants which have been established on the marshland at the head of the bay, and to the communities of Douglaston and Bayside immediately contiguous thereto. The improvement is regarded as belonging to that class which would benefit local navigation and local interests rather than the general navigation of the harbor of New York City or the country. Further, the navigation is small in amount and from present indication is not likely to grow to any considerable proportion in the near future. In view of these facts it is my opinion that the locality is not worthy of improvement by the United States at the present time.

The terminal and transfer facilities are as above stated. The improvement desired by local interests involves no questions of the development of water power for industrial or commercial purposes.

Very respectfully,

S. W. ROESSLER,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, June 24, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views and opinion of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 2, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Little Neck Bay is a shallow indentation in the north shore of Long Island near the eastern limits of the city of New York. The upper end of the bay is a salt marsh through which a tortuous tidal slough or creek meanders, in the vicinity of which are located a few industrial plants which are the principal interests concerned in the improvement now desired. The upper portion of the bay, including the creek, is practically bare at low tide.

The improvement desired is a channel way through the shallow upper bay into the creek. The water-borne commerce reported amounts to

Digitized by Google

about 16,500 tons, consisting principally of coal, in addition to which some building and road material is brought in for local use. The locality is essentially a residential district, and as there are no important manufacturing industries, it does not seem probable that a commerce of sufficient magnitude to merit recognition by the General Government will be created in the near future.

In view of the facts briefly outlined above, and given more in detail within, and the belief that resulting benefits would be local rather than general, the board concurs with the district officer and the division engineer in the opinion that the locality is not worthy of improvement by the General Government at this time.

Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on the subject have been received. The district officer describes existing wharves and terminal facilities, and the board reports, in compliance with law, that there are no questions of water power or other related subjects which have any material bearing upon the improvement in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

H D—62-2—vol 25——4

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 428.

ABITA RIVER, LA.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF ABITA RIVER, FROM ABITA SPRINGS TO BOGUE FALIA, LA.

JANUARY, 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of report from Lieut. Col. L. H. Beach, Corps of Engineers, dated May 16, 1911, of a preliminary examination of Abita River from Abita Springs to Bogue Falia, La., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated May 16, 1911, by Lieut. Col. L. H. Beach, Corps of Engineers, on preliminary examination of Abita River from Abita Springs to Bogue Falia, La., made in pursuance of the river and harbor act approved June 25, 1910.

Digitized by Google

Abita River is a small stream in St. Tammany Parish, Fla., flowing into the easterly side of Bogue Falia River a short distance below the town of Covington, La., and consists of two distinct portions, the lower portion being tidal and of a navigable width and depth, while the upper portion, in the vicinity of the village of Abita Springs is but 10 to 15 feet wide, 3 to 4 feet deep, narrow, and very tortuous, with a rapid current. Interested parties desire the extension of navigation to Abita Springs, so as to permit schooners, barges, tugs, etc., to reach that town, but the district officer, who is also the division engineer, reports that the channel is too narrow and the bends too numerous to permit of enlarging the natural channel, and that the only way of extending navigation to Abita Springs would be by digging a canal from the head of the tidal portion of the river to the town. The cost of such a canal would be out of all proportion to the resulting benefits, and he concludes that the locality is not worthy of improvement by the United States.

As required by law the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated June 19, 1911, concurring in the views of the district office. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Abita River from Abita Springs to Bogue Falia, La., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF ABITA RIVER, LA.

War Department,
United States Engineer Office,
New Orleans, La., May 16, 1911.

Sir: I have to submit the following report of a preliminary examination of Abita River from Abita Springs to Bogue Falia, La., as directed by the river and harbor act of June 25 and department letter of August 4, 1910.

The Abita River, so called, is a stream in St. Tammany Parish, flowing into the easterly side of Bogue Falia River a short distance below the town of Covington, La. The river consists of two distinct portions, the lower portion being at tide level with a width of from 100 feet to 40 feet and a depth at present sufficient for the passage of small steamboats, although partially obstructed by timber. The upper portion of the stream is narrow, very tortuous; and with a

Digitized by Google

rapid current except as it nears the tidal portion. The velocity of the current would indicate a considerable fall. The town of Abita Springs is located upon the upper portion of the river about a mile and a half in a direct line above what may be considered as the dividing point between the two portions. The distance by water is considerably greater, probably nearly double the direct distance. At the upper end of the town of Abita Springs the Abita River has a width of about 10 feet and a depth of 3 feet or 4 feet. At the lower end of the town the width is about 15 feet with a depth of about 5 feet. From this point the width varies, increasing slowly, but is seldom more than 30 feet until in the vicinity of the tidal portion. The current is so rapid and the bends are so short that it is believed practically impossible for even a naphtha launch to navigate the river under ordinary conditions, even were the snags and fallen trees removed. This portion of the river meanders through a bottom land from 5 feet to 8 feet above the ordinary surface of the water, which bottom land is in turn bordered by ground rising 15 to 20 feet higher.

The clause requesting the preliminary examination of the river was inserted, it is understood, at the instance of the inhabitants of Abita Springs an vicinity. Abita Springs has a population of 365. The names and population of other places along the river are: Alexiusville, 200; Mailhesville, 200; Clairborne, 300; and it is claimed that there is in the immediate district a population of 2,500, including that in the towns mentioned. Abita Springs is connected with New Orleans by the New Orleans Great Northern Railroad, distance 62½ miles, and also has communication with that city by way of Covington, La., on the Bogue Falia River, 3 miles distant, vessels running between New Orleans and Covington by way of Lake Pontchartrain, Chefuncte, and Bogue Falia Rivers. Covington is also upon the New Orleans Great Northern Railroad, 66 miles from New Orleans. Boats with a capacity of 60 tons and barges of 300 tons have during the past year navigated the lower portion of the Abita River, the articles of freight moved being mostly bricks, logs, and lumber.

It is claimed by the people of Abita Springs in best position to know the conditions, that the extension of navigation to Abita Springs so as to permit schooners, barges, tugs, and small steamers to reach that town will give a great impetus to existing traffic and develop many new lines of trade. Land lying along the river bank can, it is stated, be obtained at a reasonable price, and it is claimed that there is enough timber adjoining the river to justify the erection of a large sawmill and box factory. The trade in firewood to New Orleans would, it is also stated, be quite profitable. It is also claimed that the opening of the river would reduce greatly the danger of overflow upon the bottom lands, a thing which now occurs in times of heavy freshets. There is no question as to the fact that Abita Springs labors under a great disadvantage from existing freight rates. The rates by rail from New Orleans to Covington are considerably lower than to Abita Springs, although the latter has a haul shorter by 3½ miles. The rail rate is in fact such that the people of Abita Springs frequently find it advantageous to ship their goods from New Orleans to Covington by water, and haul them by wagon from the latter point rather

Digitized by Google

than to ship by rail. The water and rail rate to Covington and the rail rate to Abita Springs on a few of the principal items are as follows:

Articles.	Designation.	Rate by water, New Orleans to Covington.	Rate by rail—	
			New Orleans to Covington.	New Orleans to Abita Springs.
Corn	Sack	$0.08	$0.11	$0.1[illegible]
Oats	do	.10	.13	.[illegible]
Hay	Ton	1.25	1.60	2.[illegible]
Grits	Barrel	.15	.20	.[illegible]
Rice	Sack	.05	.09	.1[illegible]
Cotton	Bale	.30	.80	1.[illegible]
Peas	Sack	.08	.18	.[illegible]
Cement	Barrel	.25	.24	.[illegible]
Nails	Keg	.05	.09	.1[illegible]

An examination of the river shows that while the lower or tidal portion could be improved at small cost, no improvement of the upper portion can be made by following the course of the existing stream. The waterway is too narrow and the bends are too short and numerous to permit the idea of enlarging the natural channel to be considered. The only way of extending navigation to Abita Springs would be by digging a canal as nearly straight as possible from the head of the tidal portion of the river to the town. The cost of such a canal would be excessive, not only on account of the quantity of earth to be removed, but also on account of the great amount of timber and large number of stumps which would be encountered.

It would appear that the people have grounds to be dissatisfied with present freight rates and, considering the advantages enjoyed by Covington, it is but natural that that they should seek to be placed upon the same footing. It was stated that application to the State railroad commission to have the rates to Abita Springs reduced had been ineffective, the lower rates to Covington being authorized by that clause which permits the railroad to meet water competition. While the desire of the people of Abita Springs for cheaper transportation is something which should be realized if possible, it is difficult to see how the United States can assist them in the matter, for, without resorting to a survey, it can be readily seen that the cost of bringing water navigation to Abita Springs must necessarily be so large as to be out of all proportion to the benefits which will be derived. Under these circumstances, the officer in charge is forced to the conclusion that the locality is not worthy of improvement by the United States, and so recommends.

Water-power development is not practicable.

Very respectfully,

LANSING H. BEACH,
Lieut. Col., Corps of Engineers, U. S. Army.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

Digitized by Google

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 19, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This small stream, a few miles only in length, empties into Bogue Falia River, a tributary of Chefuncte River, which in turn discharges into Lake Pontchartrain, La. The lower part of the river is tidal and has a navigable width and depth, while the upper portion in the vicinity of the village of Abita is but 10 to 15 feet in width, with a depth of 3 to 4 feet. It is very crooked, and the district officer states that it would be necessary to leave the stream proper and dig a canal from the tidal portion of the river in order to carry navigation to the village of Abita.

It appears from the table on freight rates within that the village of Abita is discriminated against in these matters and the improvement of the river is desired in the hope of correcting this unfavorable condition. It seems clear from the facts presented that there is not sufficient commerce, present and prospective, to justify the improvement in the interests of navigation, and the policy of undertaking the improvement of small streams for the adjustment of railroad freight rates to the villages adjacent to the stream has not been adopted by Congress, and the board can find no justification for the improvement contemplated. It reports, therefore, in concurrence with the views of the district officer, who is also division engineer, that the Abita River is not worthy of improvement by the United States.

Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board in regard to the needs of improvement, but no communications on this subject have been received. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which have any material bearing upon the improvement of this stream in the interests of navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 429.

PITHLACHASCOTEE RIVER, FLA.

LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF PITHLACHASCOTEE RIVER, FLA.

JANUARY 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Capt. J. R. Slattery, Corps of Engineers, dated August 11, 1911, of a preliminary examination of Pithlachascotee River, Fla., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith for transmission to Congress, report dated August 11, 1911, by Capt. J. R. Slattery, Corps of Engineers, on preliminary examination of Pithlachascotee River, Fla., called for by the river and harbor act approved February 27, 1911.

Pithlachascotee River is a small stream lying entirely within Pasco County, Fla., and emptying into the Gulf of Mexico. It flows through comparatively high land and is navigable for a distance of about 6 miles above its mouth. The improvement desired by interested

Digitized by Google

parties is the dredging of a channel 50 feet wide and 3 or 4 feet deep at mean low water from the Gulf of Mexico up to Port Richey. The district officer states that continuous dredging for about 1½ miles through the shoal at the mouth and about one-fourth mile of dredging in spots in the river would be necessary to provide the channel desired; also, that if it were possible to maintain the channel at a reasonable cost it would be advisable to give this locality some consideration, but the difficulty of maintaining a similar channel in another river in the vicinity shows that a much larger channel would be necessary, the cost of which is not warranted by existing or probable future commerce.

As required by law, the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated October 2, 1911, concurring in the views of the district officer. Two replies were received in response to the notices of this unfavorable report, one favoring the improvement and the other expressing the opinion that work at this time is premature and that any money expended would be thrown away.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Pithlachascotee River, Fla., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF PITHLACHASCOTEE RIVER, FLA.

United States Engineer Office,
Jacksonville, Fla., August 11, 1911.

Sir: In compliance with department letter dated April 7, 1911, I have the honor to submit the following report on the preliminary examination of the Pithlachascotee River, Fla., authorized by the river and harbor act of February 27, 1911.

GENERAL DESCRIPTION OF THE LOCALITY.

The Pithlachascotee River (spelled Pithlochascotee on the coast chart and locally known as the Cootee River) is a small stream emptying into the Gulf of Mexico about 10 miles from the Anclote River, Fla. It lies entirely within Pasco County, Fla. Its source is in two swamps at the extremity of the two upper prongs which join to form the river about 11 miles upstream from the coast. The stream is tidal and is navigable for a distance of about 6 miles above its mouth, at which point it becomes blocked by snags and fallen trees. The stream flows through comparatively high land and is but little bordered by swamps. The land is well suited for farming and vegetable and fruit growing. There are about 20,000 acres of muck land

Digitized by Google

adjacent to the river which could be easily and inexpensively drained, thereby reclaiming valuable vegetable-growing land. There are altogether about 30,000 acres of land suitable for agriculture, for which the Pithlachascotee River is the natural outlet. There are about 5,000 acres of virgin standing timber in this section. Port Richey is the only post office.

TERMINAL FACILITIES.

There are no terminal facilities on the river and no public docks. It is understood, however, that a boulevard has been legally established along the river front at Port Richey for a distance of 2 miles. The boulevard includes riparian rights, which will permit the construction of public wharves and terminals throughout its length. There are a number of small private landings, which are free to all. No water power could be developed in connection with the improvement of this river.

PREVIOUS EXAMINATIONS AND SURVEYS.

No previous examinations or surveys have been made of this river.

COMMERCIAL STATISTICS.

The following is quoted from a report of Mr. J. G. Coxetter, inspector, who made the detailed examination:

The principal industries of the section adjacent to the Pithlachascotee River are fishing, stock raising, farming, fruit and vegetable growing. The exports consist of fruit, vegetables, live stock, cabbage, palmetto logs, and cordwood. The imports consist of ice, fertilizer, building material, lumber, and general merchandise. The nearest market and shipping point is Tarpon Springs, distant 12 miles from Port Richey by heavy sand wagon road. Owing to the distance to Tarpon Springs and the character of road, the haul to market is difficult and costly. Most of the commerce in this section is carried to Tarpon Springs by water, a distance by such route of about 14 miles. At high tide there is a depth of about 3 feet over the flat off the mouth of the river, and launches make the crossing at this time. There are 8 pleasure launches, 3 freight launches, and 23 fish boats and 1 lighter operating on the river. There are about 250 acres of groves, 250 acres of vegetable gardens, and 500 acres of farms in this section. The farms are usually small, as it is almost impossible to get the products to market. Altogether there are about 500 such farms in the community. The following is a tabulated statement of the commercial statistics of the Pithlachascotee River for the year ending December 31, 1910:

Articles.	Quantity.	Tons	Value.
Fish	300,000	250	$10,000
Ice	.....	500	1,500
Fertilizer	.....	500	10,000
Fruit ... crates	25,000	1,000	50,000
Vegetables ... do	20,000	600	40,000
General merchandise	.....	1,700	127,500
Cabbage palmetto logs	1,200	500	2,500
Cordwood ... cords	200	200	500
Total	.....	5,250	242,000

It is estimated that if the river were improved the acreage under cultivation would in one year be increased 200 per cent, the population 100 per cent, and the commerce 100 per cent.

Digitized by Google

IMPROVEMENT DESIRED.

The general desire of the residents of this section is for a channel 50 feet wide and 3 or 4 feet deep at mean low water from the Gulf up to Port Richey. To provide such a channel would require continuous dredging for about a mile and a half through the shoal off the mouth and about a quarter of a mile of dredging in spots in the river. If such a channel could be maintained at reasonable cost this locality might be worthy of some consideration. A 6-foot channel, 60 feet wide, was completed in 1902 at the mouth of Crystal River, Fla. It has been necessary to redredge this channel twice since it was completed. It is, therefore, not likely that any such channel as that desired by those interested on the Pithlachascotee could be maintained at a reasonable cost. It is doubtful whether a channel less than 10 feet deep and 100 feet wide could be maintained at reasonable cost. Neither the existing nor the probable future commerce of the river warrants any such improvement, and the river is, therefore, not considered worthy of improvement by the Government.

Very respectfully,

J. R. SLATTERY,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 11, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This is a small stream lying wholly within Pasco County, Fla. It is navigable for a distance of about 6 miles above its mouth. The principal industries are farming, vegetable and fruit growing. The products are now generally marketed at Tarpon Springs, about 12 miles distant. The commerce reported amounts to 5,250 tons, valued at $242,000. The depth over the bar is about 3 feet at high tide.

The improvement desired is a channel 3 or 4 feet deep at mean low tide from the Gulf to Port Richey, a distance of about 2 miles. Such an improvement would require constant dredging over the bar and at certain points in the river. The tributary population is small and there is no prospect of a commerce of magnitude. In view of these facts, the board concurs with the district officer in the opinion that Pithlachascotee River is not worthy of improvement by the General Government. The board has received two communications as a result of the district officer's notice of his unfavorable report. One of them favors the improvement; the other expresses the opinion that any money expended on the river at this time would be wasted. There are no questions of terminal facilities, waterpower, or other subjects having any material bearing upon the improvement of this waterway.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 438.

WILLAMETTE RIVER BETWEEN PORTLAND AND OREGON CITY, OREG.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF WILLAMETTE RIVER BETWEEN PORTLAND AND OREGON CITY, OREG.

JANUARY 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed with illustrations.

WAR DEPARTMENT,
Washington, January 10, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 9th instant, together with copies of reports from Maj. J. F. McIndoe, Corps of Engineers, dated October 28, 1910, and May 17, 1911, with maps, on preliminary examination and survey, respectively, of Willamette River between Portland and Oregon City, Oreg., a distance of 13 miles, made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 9, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated October 28, 1910, and May 17, 1911, with maps, by Maj. J. F. McIndoe, Corps of Engineers, on preliminary examination and survey, respectively, called for by the river and harbor act

Digitized by Google

approved June 25, 1910, of Willamette River, between Portland and Oregon City, Oreg., a distance of 13 miles.

The existing project for improvement of this portion of Willamette River provides for a channel 12 feet deep at low water to Oswego, 8 miles above Portland, and a minimum depth of 3½ feet from that point to Oregon City. It appears that the 12-foot depth was originally proposed for the benefit of the iron and steel works at Oswego, which have since ceased operations, and this depth is no longer necessary, as the maximum drafts of boats now engaged in river traffic above Portland is between 4 and 5 feet.

The district officer proposes the abandonment of the 12-foot portion of the existing project, and to obtain by dredging where necessary a 6-foot low-water channel from Portland to Oregon City 150–200 feet wide below, and 100 feet wide above the head of Clackamas Rapids, and the removal of Copeleys Rock, situated about 9 miles above Portland, to a like depth. The estimated cost of this work is $24,000, with $2,500 annually for maintenance. An initial appropriation of $12,000 is recommended by the district officer to be included under the same appropriation title as that for Willamette River between Oregon City and Harrisburg.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated July 3, 1911, attention is invited. The board and the division engineer concur in recommending the plan of improvement proposed by the district officer.

After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Willamette River between Portland and Oregon City, Oreg., is deemed advisable so far as to secure an available channel depth of 6 feet at low water and a channel width of 150–200 feet below the head of Clackamas Rapids and width of 100 feet above, also the removal of Copeleys Rock, following in general the methods described in the report of the district officer, at an estimated cost of $24,000 for first construction and $2,500 annually for maintenance, these estimates being based on the supposition that the work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $12,000 and a subsequent appropriation of $12,000.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF WILLAMETTE RIVER BETWEEN PORTLAND AND OREGON CITY, OREG.

United States Engineer Office,
Portland, Oreg., October 28, 1910.

Sir: In compliance with department letter of August 4, 1910, I have the honor to submit the following report on the preliminary examination of Willamette River between Portland and Oregon City, Oreg., provided for in the river and harbor act approved June 25, 1910.

Digitized by Google

Oregon City is situated on the right or east bank of the Willamette River, about 13 miles above Portland. At Oregon City the Willamette Falls are located, having a perpendicular fall of about 40 feet at low water. This obstruction is overcome by a canal, with a series of four locks, constructed and operated by a private corporation. The last river and harbor act (1910) contained an appropriation for either purchasing this canal and locks or for constructing a new canal and locks.

The deep-water project for the harbor of Portland extends upstream to the foot of Ross Island, opposite the southern part of the city.

Under the provisions of the river and harbor act of June 13, 1902, an examination and survey of the same stretch of the Willamette River were made, and reports thereon are printed in House Document No. 504, Fifty-eighth Congress, second session. The survey was confined to localities where shoals or obstructions of any nature were known to exist. Relative to these obstructions the following is quoted from the report on the survey:

> The present project for the improvement of the Willamette River calls for a depth of 12 feet at low water to Oswego, 8 miles above Portland, and a minimum depth of 3½ feet above that point.
>
> Proceeding upstream, the first obstruction is found opposite Ross Island, 2 miles above Portland (Madison Street Bridge), at which point the deep water divides into two channels, and a gravel bar is formed 1,000 feet in length, on which there is but 7 feet depth at low water.
>
> The second obstruction is found opposite Sellwood, 3½ miles above Portland, at which point there is a shoal, carrying about 8 feet at low water.
>
> Three gravel shoals, carrying less than 4 feet at low water, are found on the 10 to 11 mile stretch above Portland. These are named Jennings, Meldrums, and Magoons Bars, respectively.

Reefs were also found at Elk Rock, Oswego, and Copeley Rock, 5½, 7¼, and 9 miles above Portland, respectively, which were more or less dangerous to navigation. The report recommended the dredging of Jennings, Meldrums, and Magoons Bars and the bar at the head of Clackamas Rapids to a depth of 4 feet below low water, and the removal of Copeley Rock, at an estimated cost of $5,100.

A personal examination of the river between Portland and Oregon City has been made and the obstructions enumerated above have all been observed. The present ruling depth between the two cities is 3 feet at extreme low water, the most serious obstruction to navigation being at Clackamas Rapids, 1 mile below Oregon City, where there is a fall of about 5 feet in 2,000 feet, with a resultant very rapid current, compelling steamboats to resort to "lining" in order to make headway upstream.

From information gathered by personal observation and by correspondence with the principal business houses using this portion of the river for the transportation of their commodities, it is clear that navigation would be greatly augmented by an increase of available depth in the channel. At present the bulk of the river traffic is carried on by the pulp and paper companies of Oregon City and the Oregon City Transportation Co., of Portland. It is stated upon reliable authority that the mills on the west side of the river at Oregon City produce over 200 tons of paper per day, 80 per cent of which could be shipped at all times by water if river conditions would allow. The maximum draft of towboats used in this business

Digitized by Google

is between 4 and 5 feet. It is estimated that with a 6-foot depth at low water the amount of freight that would be carried annually between Oregon City and Portland in the paper industry alone would be as follows:

66,000,000 feet of logs (198,000 tons), at $3	$594,000
60,000 tons paper, at $60	3,600,000
11,000 tons sulphur, at $14	154,000
55,300 tons oil, at $3	165,900
3,100 tons general supplies, at $100	310,000
	4,823,900

The bulk of the passenger traffic is handled by the Oregon City Transportation Co. It is stated that since 1892 the business has seriously deteriorated, but that with deeper water faster boats can be run and the traffic revived.

Portland being the business center, practically all the upriver traffic of the Willamette River passes over this portion of the river, the commercial statistics for the last calendar year being 519,250 tons freight, valued at $9,295,384, and 24 vessels carrying 43,299 passengers.

The present commerce consists of merchandise, building materials, raw material, wool, dyestuffs, pipe, woolen goods, machinery, lumber, shingles, leather, farm and orchard products, fuel oil, paper, pulp, logs, etc.

It is my opinion that the value of the commerce carried on this section of the Willamette River makes the stream worthy of improvement by the United States. Its improvement will become more urgently necessary in the near future with the establishment of free navigation around the falls of the Willamette. On account of some changes which have taken place since the local surveys were made in 1902, and in order to determine the probable effect of open-channel work at Clackamas Rapids and other bars, upon the low-water surface at the lower end of the locks, it will be necessary to make a survey. It is therefore recommended that an allotment of $2,000 be made for a survey and for preparation of plan and estimate of cost of improvement.

The terminal docks and facilities at the present time are inadequate for any marked increase of traffic, but it is stated that upon the improvement of the channel these requirements will be promptly met by both public and private enterprise. There are no wharves owned by the public between Portland and Oregon City, and outside of the street ends, which are not convenient and the title to which is open to dispute, there is no public land available for this purpose. The present terminal and transfer facilities are practically limited to the wharves and warehouses of the Oregon City Transportation Co., one in Portland and one in Oregon City, together with such private docks as are used in both cities and en route between, for the owners' convenience.

At Oregon City the warehouse and wharf are erected on public property, leased from the city.

The terminal and transfer facilities existing at Portland were covered in reports on the Columbia and Lower Willamette Rivers below Portland, submitted under dates of August 16, 1909, and August 27, 1910 (printed in H. Doc. 1278, 61st Cong., 3d sess.) As

Digitized by Google

stated, the city of Portland has already voted a bond issue of $500,000 for municipal wharves. At the regular election to be held in November the voters of Portland will vote upon a measure providing for a bond issue of $2,500,000 for public docks and for the creation of a commission to carry on the work and to regulate and control all water-front structures.

The section of the Willamette River between Portland and Oregon City has no valuable water power capable of development.

Very respectfully,

J. F. McINDOE,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., October 31, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, recommending that an allotment of $2,000 be made for a survey, as recommended by the district engineer.

CHAS. E. L. B. DAVIS,
Brigadier General, United States Army,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 14, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

The stretch of river covered by this examination between Portland and Oregon City is 13 miles in extent. The present project for this part of the Willamette River has in view a depth of 12 feet up to Oswego, 8 miles above Portland, and a minimum depth of 3½ feet above that point. The controlling depth at low water at present is 3 feet. The commerce carried over this reach is reported as amounting to 519,250 tons, valued at $9,295,384, and 43,299 passengers. It is estimated that if a depth of 6 feet were provided the commerce of the paper mills at Oregon City alone would amount to about 129,000 tons annually, exclusive of 66,000,000 feet of logs.

The district officer is of opinion that the stream is worthy of improvement by the United States and recommends that a survey be authorized. In this view the division engineer concurs.

It appears that the most serious obstruction to navigation is at Clackamas Rapids, 1 mile below Oregon City, where there is a fall of about 5 feet in 2,000 feet, with the resulting very rapid current. Whether this and other obstructions can be overcome at reasonable cost should, in the opinion of the board, be determined before deciding upon the question of advisability. The board therefore concurs in recommending a survey and estimate. In the opinion of the board the estimated cost of the survey is quite large.

For the board:

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Senior Member Present.

Digitized by Google

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 22, 1910.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Willamette River between Portland and Oregon City, Oreg., authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

EDW. BURR,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT, *November 23, 1910.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

SURVEY OF WILLAMETTE RIVER BETWEEN PORTLAND AND OREGON CITY, OREG.

UNITED STATES ENGINEER OFFICE,
Portland, Oreg., May 17, 1911.

SIR: In compliance with department letter of November 29, 1910, I have the honor to submit the following report on the survey of the Willamette River between Portland and Oregon City, Oreg., provided for in the river and harbor act approved June 25, 1910.

The improvement of this stretch of the Willamette River has been included in the general project for improving the Willamette River above Portland, adopted in 1870 and modified from time to time. In 1891 surveys were made at Ross Island and Clackamas Rapids, in compliance with river and harbor act of September 19, 1890, and reference is invited to the reports with plans of improvement printed in Executive Document No. 28, Fifty-second Congress, first session. The river and harbor act of August 18, 1894, provided for a survey of the river from Portland to Eugene, and the report is published in House Document No. 260, Fifty-fourth Congress, first session. An examination and survey of the stretch between Portland and Oregon City were also made in compliance with the act of June 13, 1902, and report thereon is printed in House Document No. 504, Fifty-eighth Congress, second session. The existing project provides for a low-water depth of 12 feet over the first 8 miles of river between Portland and Oswego, for a depth of 4 feet over the bars between Oswego and Oregon City, and for the removal of Copeleys Rock, but the report last referred to recommended that the dredging to obtain the 12-foot channel to Oswego be deferred, as there was at that time (1903) but little if any necessity for it. The 12-foot channel to Oswego was included in the project of 1896 because at that time the works of the Oswego Iron & Steel Co. were located there, and in 1903 these works were being operated only to a limited extent for the manufacture of gas and water

Digitized by Google

pipe. These works have now been abandoned, and there appears to be no demand on the part of navigation interests for a channel of this depth. As stated in report of preliminary examination submitted on October 28, 1910, the maximum draft of towboats engaged in river traffic above Portland is between 4 and 5 feet, and it is my opinion that the present and prospective demands of commerce will be served by securing a least depth of 6 feet at low water between Portland and Oregon City.

The survey of the river, authorized by the Secretary of War, was commenced in November, 1910, upon completion of the survey at Willamette Falls, and was carried on under adverse weather conditions, aggravated by high water and swift current in the river, until January 25, 1911, when it was discontinued. It was resumed February 13 and completed March 11, 1911. It was made under the general supervision of Assistant Engineer E. Burslem Thomson, and the plan and estimate of cost of improvement were prepared by him under my direction in this office.

A map of the river in three sheets is submitted herewith. A complete system of triangulation was established as shown in tabulated statement on the maps. A line of levels was run from Portland to Oregon City and permanent bench marks established where shown. A list with descriptions is given in tabulated form on sheet No. 1. The banks and outlines of shoals were located by stadia measurements checked by connection with the computed triangulation distances. Soundings were taken with a graduated rod until a depth of 16 feet was recorded, when a lead line graduated to single feet was used. The location of soundings was determined by stadia measurements to the ends of the lines and angular intersections.

Starting at Portland there are no obstructions to a 6-foot channel until about a mile and a half above Oswego where a rock known as Copeleys Rock forms a serious menace to passing boats. This rock should be removed. Elk Rock Reef, near Milwaukee, and Oswego Rock are not channel obstructions and can be guarded against by properly placed buoys.

The first point where dredging will be necessary is Jennings Bar, about 10 miles above Portland, where a cut about 800 feet in length will connect the adjacent 6-foot contours. From here to the foot of Clackamas Rapids are three bars about 700 feet apart, requiring a total length of cut of about 2,700 feet.

At the head of the rapids a ridge about 900 feet in length must be removed for a width of 100 feet. It is considered advisable to make the cuts below this point from 150 to 200 feet wide, to provide for the passing of boats in the bends, where the rapid current makes navigation difficult.

I do not think it necessary at present to make provision by dike or dam for the training of the confluence of the Clackamas River. Any attempt to divert the outflow northward would be costly and problematical in result. For the proposed depth of 6 feet occasional dredging will suffice and be more economical.

The elevations of the water surface from the head of Clackamas Rapids, about a mile below Oregon City, to the foot of the rapids, are as follows. (The stations denote the number of feet below the suspension bridge, Oregon City.)

Digitized by Google

Stations.	Fall, in feet.	Slope.	
		Ratio.	Per cent.
4,600 to 5,351	0.42	1 in 1.78[illegible]	[illegible]
5,351 to 5,638	1.01	1 in 284	[illegible]
5,638 to 5,738	.45	1 in 222	[illegible]
5,738 to 6,151	.50	1 in [illegible]	[illegible]
6,151 to 6,561	.17	1 in 2.412	[illegible]
6,561 to 7,081	.27	1 in 1.92[illegible]	[illegible]

Total distance, 2,481 feet.
Total fall, 2.82 feet.

Reports on previous surveys indicated a fall of about 5 feet in half a mile at this point. It is probable that the reduction in slope may be partly due to recent dredging at this locality.

The river bottom at the rapids is of broken rock and large pebbles, and between stations 4700 and 5500 forms a weir with its summit at station 5300, having about 3 feet on the crest at low water.

The removal of this obstruction to afford a least depth of 6 feet at low water, it is estimated, will lower the low water-plane of the basin at the foot of the locks about 1.2 feet, necessitating a corresponding lowering of the lowest lock sill at Oregon City. The present owners of the locks, the Portland Railway Light & Power Co., have applied for War Department authority to make this change during the coming low-water season.

The estimated cost of a channel 6 feet deep at low water is as follows:

Removing Copeleys Rock, 350 cubic yards of rock, at $4.50		$ [illegible]
Dredging:		
	Cubic yards.	
Jennings Bar	13,800	
Meldrums Bar	8,600	
McGoons Bar	12,900	
Foot of Clackamas Rapids	13,800	
Head of Clackamas Rapids	24,400	
	73,500, at 25 cents	18 [illegible]
Engineering and contingencies		4 [illegible]
Total		24,[illegible]

The low-water stages on this stretch of the river are during the months of August, September, and October, and the ruling depth, which is found to be at the head of the Clackamas Rapids, is 3 feet at low water. This forms a serious obstruction to present navigation in the summer season, and has caused the Willamette Pulp & Paper Co., of Oregon City, to build a railroad between Oregon City and Oswego to handle the logs consumed at their plant. The vice president of this company, in a letter to this office dated September 1[illegible], 1910, states that forty to forty-five million feet of logs for their factory are annually handled by this railroad, and that—

> The present commerce is very much smaller than possible under better conditions; for instance, the mills on the west side of the Willamette River produce between [illegible] and 210 tons of paper per day. Eighty per cent of this product could be shipped at all times by water if river conditions would allow.

Statistics of commerce for the year 1910 have not yet been tabulated in this office, but the following comparative statement of traffic will

Digitized by Google

show the growth of freight traffic on the river in the 10 years ending with 1909:

Calendar year.	Short tons.	Estimated value.	Passengers.
1900	182,458	.....	47,324
1901	191,901	.....	103,971
1902	192,227	.....	95,221
1903	236,823	.....	66,510
1904	332,130	$11,260,196	65,947
1905	362,258	12,119,596	67,396
1906	383,911	7,591,623	41,160
1907	412,846	8,193,746	41,998
1908	403,148	8,014,164	29,029
1909	519,250	9,295,384	43,299

For details of the traffic for the year 1909 reference is invited to page 2400 of the Annual Report of the Chief of Engineers for 1910. While these figures include some traffic between up-river points, this is so small as to be negligible, the bulk of the traffic being through the locks at Oregon City between up-river points and Portland, or between Oregon City and Portland.

The traffic from Portland to points above Oregon City is carried on by stern-wheel boats drawing from 2 to 2½ feet loaded, and that between Portland and Oregon City by towboats and large barges drawing from 4 to 5 feet. The traffic to be considered, therefore, at the present time is the latter which, as shown in preliminary report to the Chief of Engineers of October 28 last, amounts (assuming a minimum depth of 6 feet of water) to an estimated value of $4,823,900 for the paper industry alone.

For remarks on docks and transfer facilities reference is invited to the report on preliminary examination. Since the date of that report the city of Portland has voted a bond issue of $2,500,000 for the acquirement, construction, maintenance, and operation of public docks, and has created a public dock commission to carry on the work and to regulate and control wharves, docks, slips, piers, basins, and other water-front structures in said city.

It is my opinion that the value of the commerce carried on this section of the Willamette River makes it worthy of improvement by the United States to the extent of providing a 6-foot channel between Portland and Oregon City, at an estimated cost of $24,000, as outlined herein.

It is estimated that the work can be done in two seasons by hired labor and the use of Government plant, and, if the project is adopted by Congress, it is recommended that the initial appropriation be $12,000, and that it be included under the same appropriation title as that for the Willamette River between Oregon City and Harrisburg, report on which is printed in House Document No. 13, Sixty-second Congress, first session.

After the channel has been dredged to the depth of 6 feet at low water it is estimated that about $2,500 per year will be required for maintenance.

Very respectfully,

J. F. McINDOE,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

Digitized by Google

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., June 5, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, recommended for approval.

In making a series of cuts in a river such as the Willamette there is usually danger that the making of one cut will lower the water on those above and consequently cause the amount of material to be dredged to be greater. The district officer informs me that he has considered this point; that the dredged material will be placed in the river so as not to diminish the cross section, and is of such consistency when deposited and flattened out by hydraulic jet as to remain in place, consequently that the allowance made for lowering the pool at the foot of the Oregon City locks will be ample. Under these conditions it appears, therefore, probable that the amount estimated to be dredged will be sufficient to secure the proposed 6-foot depth.

The estimated cost of dredging is based, I am informed by the district officer, on similar work in the upper Willamette.

JOHN BIDDLE,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, July 3, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

A survey having been made of the Willamette River between Portland and Oregon City, the district officer submits an estimate of cost in the sum of $24,000 for removing Copeleys Rock and dredging through certain shoals with a view to establishing a channel 6 feet deep at low water. The cost of maintenance is estimated at $2,500 per year. The survey developed the fact that the slope at Clackamas Rapids, the worst obstruction to navigation, is considerably less than indicated by earlier data, rendering the proposed improvement feasible at reasonable cost.

The 6-foot project is intended to supersede the existing project, which provides for a low-water depth of 12 feet over the first 8 miles of river between Portland and Oswego, a depth of 4 feet over the bars between Oswego and Oregon City, and for the removal of Copeleys Rock. It appears that, due to the abandonment of the works of the Oswego Iron & Steel Co., a depth of 12 feet between Portland and Oswego is no longer required. The maximum draft of towboats engaged in river traffic above Portland is stated by the district officer to be between 4 and 5 feet, and it is his opinion that the present demands of commerce will be served by securing a least depth of 6 feet at low water between Portland and Oregon City. The commerce is of considerable size and value, and the board concurs with the district officer and division engineer in believing that it is advisable for the United States to undertake the improvement of the river between Portland and Oregon City with a view to obtaining and maintaining a channel 6 feet deep at low water, at an estimated cost

Digitized by Google

of $24,000 and $2,500 annually for maintenance. An initial appropriation of $12,000 is recommended, to be included under the same appropriation title as that for the Willamette River between Oregon City and Harrisburg.

Terminal and transfer facilities are discussed in the report on preliminary examination, and it is stated in the report on survey that the city of Portland has voted a bond issue of $2,500,000 for the acquirement, construction, maintenance, and operation of public docks. There are no questions of water power or other related subjects materially affecting the improvement of this stretch of the Willamette River.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 442.

HARBOR AT NEW BEDFORD AND FAIRHAVEN, MASS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF EXAMINATION AND PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF HARBOR AT NEW BEDFORD AND FAIRHAVEN, MASS.

JANUARY 12, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, January 11, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 10th instant, together with copies of reports from Lieut. Col. J. C. Sanford, Corps of Engineers, dated December 28, 1910, and April 21, 1911, with maps, on preliminary examination and plan and estimate of cost of improvement, respectively, of the harbor at New Bedford and Fairhaven, Mass., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON, *Secretary of War.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 10, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated December 28, 1910, and April 21, 1911, with maps, by Lieut. Col. J. C. Sanford, Corps of Engineers, on preliminary examination and plan and estimate of cost of improvement, respectively, called for by the river and harbor act of June 25, 1910,

Digitized by Google

of the harbor at New Bedford, and Fairhaven, Mass., with a view t extending the channel to Belleville.

The existing project as adopted in 1907 and modified in 1908 a 1909 provides for a channel 25 feet deep at mean low water, and 3 feet wide, from Buzzards Bay to the north end of Fish Island, ju above the New Bedford and Fairhaven bridge, a turning basin abo the bridge, and an anchorage area of about 114 acres, 25 feet dee between New Bedford and Fairhaven below the bridge, together wi an extension of the channel in front of the wharves up to the bridge.

The work now desired is the extension of a channel up the Acushn River from the upper anchorage basin to Belleville, 2.15 miles, which part of the harbor no work has yet been done by the Unit States. The district officer submits a plan providing for a chann through this reach, 18 feet deep at mean low water, 100 feet wide the bottom, with some widening at the bend below Coggeshall Stre Bridge, and a turning basin about 300 feet wide at the upper end, at an estimated cost of $56,610, with $3,000 per annum for maint nance. He recommends that the execution of this work be conditione upon the construction by local authorities of a new bridge at Cogg shall Street, with at least one draw opening of 100 feet, and the buil ing of a substantial wharf by the city upon its property at Bellevil The division engineer and the Board of Engineers for Rivers a Harbors, in their reports herewith, express concurrence in the vie of the district officer.

After due consideration of the above-mentioned reports, I conc in general with the views of the district officer, the division engine and the Board of Engineers for Rivers and Harbors, and therefore, carrying out the instructions of Congress, I report as follows: Th the improvement by the United States of the harbor at New Bedfo and Fairhaven, Mass., is deemed advisable so far as to secure a available channel depth of 18 feet and a bottom width of 100 fe increased at bend from the upper anchorage basin to Belleville, su ject to the conditions stated in the report of the district officer, at a estimated cost of $56,610 for first construction and $3,000 annual for maintenance, these estimates being based on the supposition th the work will, as now seems desirable and advantageous, be pros cuted under a first appropriation of the full amount of the estimate cost.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF HARBOR AT NEW BEDFORD A FAIRHAVEN, MASS.

United States Engineer Office,
Newport, R. I., December 28, 1910.

Sir: I have the honor to submit the following report on the pr liminary examination of the harbor at New Bedford and Fairhave Mass., with a view to extending the channel to Belleville, in com pliance with section 3 of the river and harbor act of June 25, 1910.

The Acushnet River rises in southeastern Massachusetts, about miles north of New Bedford. At the northern limit of New Bedfor

Digitized by Google

t is a narrow and shallow stream, but from this point down it widens rapidly, forming an estuary which constitutes the harbor of New Bedford and Fairhaven. Belleville is the name given to that part of New Bedford (40 to 50 acres, formerly the property of the Belleville Association) at the foot of Belleville Road, which road extends to the river at a point where a wharf or bulkhead formerly existed. It is about 2.15 miles above the New Bedford and Fairhaven Bridge, near the center of New Bedford, and about 0.92 mile above the Coggeshall Street Bridge, these two being the only bridges below it. The depths between the Belleville Road and the 25-feet-deep turning basin, dredged by the Government in 1908 just above the New Bedford and Fairhaven Bridge, are about 6 feet at Belleville Road, 16 feet at Coggeshall Street Bridge, and 20 feet just above the turning basin.

A preliminary examination of the locality was made in 1905 by Lieut. Col. J. H. Willard, Corps of Engineers, as part of the examination of New Bedford and Fairhaven Harbors (report printed in House Document No. 271, Fifty-ninth Congress, second session). The harbors, including the Acushnet River to Belleville wharf, were reported as worthy of improvement. His report, dated May 18, 1906, on the survey (printed in above House document), contained an estimate for improving the harbors to just above the New Bedford and Fairhaven Bridge to a depth of 25 feet at mean low water, and extending the improvement to Belleville wharf by a channel 18 feet deep and not less than 100 feet wide, with turning basin. The Board of Engineers for Rivers and Harbors was, however, of the opinion that the proposed 18-foot channel to Belleville could not properly be considered under the act calling for the examination, in which opinion the Chief of Engineers concurred (see above House document).

Before making a personal examination of the locality, full information was asked by circular letter from all persons thought to be interested as to what was desired and the reasons therefor, the letter containing a list of definite questions as to the present and prospective commerce, rates, terminal facilities, etc. Due to the active interest taken in the matter by Mr. William F. Williams, city engineer of New Bedford, very complete replies to these questions were received, together with various statistics and a tracing showing the location of the manufacturing plants in that part of New Bedford north of the New Bedford and Fairhaven Bridge, with the estimated amount of raw cotton and coal that would be consumed by each in the calendar year 1910. A combined statement answering the questions contained in the circular letter and signed by the heads of all the corporations located north of the bridge was also received. From these and other sources and from information obtained by the examination and by previous visits to New Bedford, it appears that in the past few years the manufacturing plants and particularly the cotton mills of the city have rapidly increased in number and capacity, $5,540,000 capital having been invested in new mills in the first six months of 1910, and nearly $10,000,000 in 1909. The majority of the cotton mills are located on the water front above or below the center of the city. The population of the city has increased from 62,442 in 1900 to 96,652 in 1910. It is now stated to rank first in the United States in the manufacture of fine cotton goods and fine yarns, and second in the number of spindles.

Digitized by Google

The total capitalization of the cotton mills along the Acushi River north of the New Bedford and Fairhaven bridge is ab $21,760,000, and the total number of the employees about 14,500. is estimated that these mills will consume 168,650 bales of raw cott and 135,575 tons of coal in the calendar year 1910. Two of th mills, estimated to consume 24,000 bales of cotton and 32,500 t of coal, are located just above Belleville Road, and have been b since the survey of 1906. In addition, the Taunton-New Bedf Copper Co., located along this part of the river, consumes ab 5,000 tons of coal annually. Only one of these mills, the Wamsu which is the most southerly one, has a wharf. The coal used by mill is brought by water. All the other cotton mills get their c by team from the coal yards in New Bedford Harbor. The cost this teaming was not furnished me. The city engineer says:

It is impossible to ascertain the teaming rate per ton for delivering coal to the n This is due to the fact that the coal is sold to the mills delivered at their coal bin teaming being done by the coal dealer.

As to the proposed improvement of the river and the difficul now experienced by the Wamsutta Mills, the treasurer, Mr. Edward Pierce, writes:

Replying to yours of the 30th, it seems to us that improvement of the chann the Acushnet River north to Belleville Road so that vessels drawing 16 to 18 fe water could go that far would be a great benefit to the city. It is too far north of any great help to us, but on account of the large number of mills situated in part of the city, and the extra cost of hauling they are now subjected to, this dred out of the channel would be a great benefit in many ways. At our wharf we are ba handicapped on account of the depth of the water in the river, and only barges vessels of light draft, which are difficult to get, are able to come to our wharf on acc of the filling up of the river. If it was dredged to a depth of 18 feet it would en vessels to come to the wharf without being lightered, which has to be done m times in shipments of coal to us, and we are compelled to pay, on account of the s water, an additional cost of 15 cents per ton over what we should have to pay if ve drawing 16 to 18 feet of water could come up here. There are many times whe have to discharge below, at Garfield & Proctor's or Denison Bros.', before the ba can get up here, and this brings additional cost.

When we are running anywhere near full, as, for instance, in 1909, we discha at our wharf here 31,964 tons of coal, 932,000 feet of lumber, and about 5,842 ton different material.

We use anywhere from 28,000 to 32,000 bales of cotton yearly.

There is no reason why we should not take in more than double the amount sta above at our wharf, if there was sufficient water to allow the vessels to come here

The freight statistics quoted above give, it is stated, all the pre commerce of this part of the river. As to prospective commerce the river should be improved, it seems probable that all the coal u by the mills would be brought by water. Some of the cotton other supplies would probably also be so brought, either directly by lighters from New Bedford Harbor, in order to avoid the pre transfer by teams. There is considerable unoccupied shore proper on the Fairhaven side which would furnish desirable factory site the river were improved, so that the future commerce might increased by the erection of new mills.

The Coggeshall Street Bridge would, in its present condition, fo a serious obstruction to the improvement of the river. It has t draw openings, each 40 feet wide at the water surface, the draw be operated by hand. There are no reliable records as to the plans un which this bridge was built, and it is not known at what depth piers are founded or whether or not they are protected by ripr

Digitized by Google

though it is thought that the pivot pier is so protected. Owing to the slowness of operating the draw and the narrowness of the openings this bridge is also a serious obstruction to navigation. The steel framework, originally very light, has been greatly weakened by corrosion, so that the bridge will probably have to be rebuilt within a few years.

Of the special subjects on which a report is directed by the act of June 25, 1910, the only one applicable to this case is that regarding terminal and transfer facilities. The only wharf is that belonging to the Wamsutta Mills. This wharf is open to public use at uniform rates, and there is a railroad track on it.

An area at the foot of Belleville Road, extending along the river about 100 feet, belongs to the city and is available for the construction of a public wharf.

In my opinion the locality is worthy of improvement by the General Government, provided the local authorities rebuild the Coggeshall Street Bridge so as not to obstruct the improvement work or the navigation of the river and construct at the foot of Belleville Road a suitable public wharf, open to all on equal and reasonable terms. No survey is necessary, as sufficient data is now on hand on which to base an estimate of cost.

Very respectfully,

J. C. SANFORD,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

ENGINEER OFFICE, NORTHEAST DIVISION,
New York, January 11, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of Lieut. Col. Sanford that the locality referred to in the within report on preliminary examination of the harbor at New Bedford and Fairhaven is worthy of improvement by the General Government, subject to the provisions mentioned in the last paragraph of his report. It is recommended that Lieut. Col. Sanford be authorized to prepare a project for the work he deems necessary with an estimate of cost.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 24, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The existing project for New Bedford and Fairhaven Harbors provides for a channel 25 feet in depth from Buzzards Bay, an anchorage basin between New Bedford and Fairhaven, and a turning basin just above Fish Island, which is crossed by the Fairhaven Bridge. Commercial developments have extended the business of the locality up the Acushnet River to Belleville, a distance of about 2 miles.

The improvement desired is a channel 18 feet in depth over this reach with a view to affording suitable facilities for the receipt of the

Digitized by Google

coal, cotton, and other commodities used by the mills located this waterway. The district officer and the division engineer are opinion that the improvement is justifiable, provided local auth ties rebuild the Coggeshall Street Bridge in a suitable manner a provide a public wharf.

New Bedford and Fairhaven have a very large and valuable co merce, and as the community enlarges it is extending up the Acush River. It appears from the information now available that desired improvement would be of material benefit to general c merce and that it is worthy of being undertaken if it can be effec at reasonable cost. To determine this question, upon which advisability depends, it is recommended that an estimate be auth ized.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 28, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of harbor at New B ford and Fairhaven, Mass., with a view to extending the channel Belleville, authorized by the river and harbor act of June 25, 191

Inviting attention to the report of the Board of Engineers for Riv and Harbors in the preceding indorsement, I recommend that pre ration of a plan and estimate of cost of improvement of the locali as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army

[Fifth indorsement.]

WAR DEPARTMENT,
January 30, 1911.

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF HARBOR A NEW BEDFORD AND FAIRHAVEN, MASS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., April 21, 1911

SIR: In compliance with your letter of January 31, 1911, assignin to me the duty of preparing a plan and estimate of cost of the improv ment of the harbor at New Bedford and Fairhaven, Mass., with a vie to extending the channel to Belleville, as ordered in the river a harbor act of June 25, 1910, I have the honor to submit the follow report, with plan and estimate of cost:

The proposed channel is in the Acushnet River and would exte in a northerly direction for a distance of about 2.15 miles from t

Digitized by Google

ew Bedford and Fairhaven Bridge, near the center of New Bedford. map in two sheets, showing the results of the survey made in 1905, respectfully submitted herewith. This extends from a short dis- nce below the New Bedford and Fairhaven Bridge to Belleville harf, and shows the connection of the proposed channel with the nprovements now in progress in the harbor. There is also sub- itted a tracing,[1] prepared by Mr. William F. Williams, city engineer New Bedford, showing the locations of the manufacturing plants that part of New Bedford north of the New Bedford and Fairhaven ridge, with the estimated amount of raw cotton and coal that would e consumed by each in the calendar year 1910.

On the map of the survey of 1905 is indicated a channel which, if redged to a depth of 18 feet at mean low water, with a turning basin its northerly end, should, in my opinion, satisfy both the present nd prospective needs of commerce and at the same time not involve ccessive cost. The estimated cost of the work is as follows:

redging 343,090 cubic yards, at 15 cents per cubic yard	$51,463.50
ngineering and contingencies, about 10 per cent	5,146.50
Total	56,610.00

The character of the material to be dredged is generally mud, with me harder material above the Coggeshell Street Bridge, but as e tow to the dumping ground involves the passage of two draw ridges, it is believed that the price of 15 cents per cubic yard is not ccessive.

A further examination of the subject confirms the opinion as to the esirability and importance of the improvement as expressed in my port on the preliminary examination of the locality, dated December 3, 1910. In my opinion, the extent of improvement justified by e commercial and other interests involved should comprise a nnel of 100 feet bottom width, with an enlargement at the bend elow Coggeshell Street Bridge and an enlargement at the upper end about 300 feet in width to serve as a turning basin for vessels.

Of the special subjects on which report is directed by the act of une 25, 1910, the establishment of terminal and transfer facilities is ne of importance in this harbor. The city of New Bedford owns a harf on the main harbor a short distance below the New Bedford nd Fairhaven bridge, which also adjoins the tracks of the New York, ew Haven & Hartford Railroad Co., and while there are no tracks t present on this wharf, it is in such a position that connection with e railroad could easily be made whenever the necessity for it ould become manifest. The wharf of the Wamsutta Mills, above e bridge and a short distance above the lower end of the proposed hannel, is provided with a track connecting the main line of the ilroad, and is open to public use at uniform rates. Property at e north end of the proposed channel with about 100 feet frontage on e river is owned by the city, and in my opinion the city should uild a substantial public wharf at this site extending out into the hannel, which would be for the landing of material for local con- mption and therefore not especially in need at present of railroad racks.

[1] Not printed.

Digitized by Google

The New Bedford and Fairhaven Bridge is provided with a sw draw of modern construction, with two openings of 100 feet e The Coggeshall Street Bridge is an old bridge, with two 40-f openings in the draw, and should be replaced by a new bridge w at least one opening of 100 feet width.

In my opinion, the improvement of the harbor by the Govern to the extent of the channel described above is justified by present and prospective commerce, but its execution should be ditioned upon the construction by the local authorities of a bridge at Coggeshall Street with at least one draw opening of feet and upon the construction of a substantial wharf upon the property at Belleville.

The work should be done at the rate of about 50,000 cubic y per month and be entirely completed during a single working son, so that the initial appropriation in case the project is ado by Congress should include the entire estimate of cost of the pro The estimated cost of maintenance is $3,000 per annum.

Very respectfully,

J. C. SANFORD,
Lieut. Col., Corps of Engine

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

ENGINEER OFFICE, NORTHEAST DIVISION,
New York, N. Y., April 26, 19

Respectfully forwarded to the Chief of Engineers, United S Army, concurring in the opinion of the district engineer officer tha improvement of the harbor at New Bedford and Fairhaven, M is worthy of being undertaken by the General Government, under conditions mentioned within.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engine

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 19, 19

Respectfully returned to the Chief of Engineers, United S Army.

The improvement proposed by the district officer is the dre of a channel 18 feet deep at mean low water, extending northerly the New Bedford and Fairhaven bridge for a distance of about miles to Belleville, the channel to have a bottom width of 100 with a widening at the bend below Coggeshall Street Bridge a enlargement at the upper end to about 300 feet in width to serv a turning basin. The estimated cost of this improvement is $5 with $3,000 per annum for maintenance.

As a result of his further study of the subject, the district o confirms the view expressed in his report on preliminary examina as to the desirability and importance of the improvement, and presses the opinion that the improvement of the harbor by the eral Government to the extent described above is justified by present and prospective commerce, but its execution should be

Digitized by Google

ditioned upon the construction by the local authorities of a new bridge at Coggeshall Street, with at least one draw opening of 100 feet, and upon the construction of a substantial wharf upon the city property at Belleville. The division engineer concurs in this opinion.

After consideration of the facts presented the board has reached the conclusion that the present and prospective commerce of this locality is sufficient to justify the United States in extending improved navigation northward to Belleville, and it therefore concurs in recommending the adoption of the project outlined above under the conditions specified by the district officer, which are deemed requisite in the interests of commerce and navigation. The full amount of the estimate, $56,610, should be provided in one appropriation.

Wharves and terminal facilities, existing and proposed, are described in the reports on preliminary examination and survey. In compliance with law, the board reports that there are no questions of water power or other related subjects having any material bearing upon the project herein recommended.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

H D—62-2—vol 25——6

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 443.

ALTAMAHA, OCONEE, AND OCMULGEE RIVERS, GA.

LETTER

FROM

'HE SECRETARY OF WAR,

TRANSMITTING,

ITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF EXAMINATION AND SURVEY OF ALTAMAHA, OCONEE, AND OCMULGEE RIVERS, GA.

NUARY 12, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, January 11, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief Engineers, United States Army, dated 6th instant, together with pies of reports from Col. Dan C. Kingman, Corps of Engineers, ted June 23, 1909, and July 3, 1911, on preliminary examination d survey, respectively, of Oconee, Ocmulgee, and Altamaha Rivers, a., made by him in compliance with the provisions of the river and rbor act of March 3, 1909; also report of the Board of Engineers r Rivers and Harbors, dated September 26, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 6, 1912.

SIR: I have the honor to submit herewith, for transmission to ongress, reports dated June 23, 1909, and July 3, 1911, by Col. an C. Kingman, Corps of Engineers, on preliminary examination d survey, respectively, of Oconee, Ocmulgee, and Altamaha Rivers,

Digitized by Google

Ga., made under authority of the river and harbor act appro March 3, 1909. These reports have been referred, as required by to the Board of Engineers for Rivers and Harbors, and attenti invited to its report herewith dated September 26, 1911.

The river and harbor act, approved June 25, 1910, also called a preliminary examination of Altamaha River, but the dis officer ascertained by correspondence with those responsible for item (see p. 50 of this document) that the object is an examina with particular reference to the improvement for navigation by prevention of overflow and incidentally the reclamation of w land. This subject is fully covered in the reports herewith, an is not thought that Congress desires a separate report thereo response to the item in the 1910 act. This report is therefore mitted as a compliance with the instructions of both acts.

The Ocmulgee and Oconee Rivers unite to form the Altam the whole river system lying within the limits of the State Georgia. The length of the Altamaha is 144 miles, of the Ocon Milledgeville, the head of navigation on that river, 145 miles, a the Ocmulgee to Macon, the head of navigation on that river. miles, giving for this system in all 494 miles of navigable r These rivers have been under improvement for many years, at by the State of Georgia, and latterly by the United States. present project, adopted in 1890, provides for a channel 3 feet at ordinary summer low water throughout the length of the A maha and up the Oconee and Ocmulgee to Milledgeville and Ma respectively. Work under this project has consisted of the rem of snags and stumps from the channel, overhanging trees from banks, the removal of rock from shoals, dredging sand, clay, gravel, the construction of training walls and spur dams, and revetment. As the result of this work the navigation season been greatly lengthened and the project has been practicably pleted, except for a distance of about 50 miles on the Oconee R immediately below Milledgeville.

The appropriations and allotments for this system of rivers the seven years, 1905–1911, inclusive, have totaled $275,000, or ne $40,000 per year.

After due consideration of all the data available, I report that maintenance and further gradual improvement of the Oconee, Oc gee, and Altamaha Rivers by the United States is deemed advis following in general the methods which have been carried on u the existing project, and that the appropriations should be at rate of $40,000 per year, the funds to be applied to maintenan 3 feet depth during ordinary summer low water up to Milledge and Macon, and to the gradual increase of channel depth so far practicable without sacrificing the maintenance work. With plant now on hand and under construction, and with appropria at the rate recommended, a considerable amount of permanent w of improvement can be accomplished in addition to the mainte of that already secured, and the practicability of securing and m taining a somewhat greater depth than the present project pro for can be definitely determined.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Ar

The Secretary of War.

Digitized by Google

RELIMINARY EXAMINATION OF ALTAMAHA, OCONEE, AND OCMULGEE RIVERS, GA.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., June 23, 1909.

SIR: In obedience to instructions contained in department letter of larch 8, 1909, I have the honor to submit the following report of a reliminary examination of the Altamaha, Oconee, and Ocmulgee ivers, Ga., called for by the river and harbor act approved March 1909.

The Ocmulgee and the Oconee Rivers unite to form the Altamaha, nd the whole river system lies within the limits of the State of eorgia. The total length of the Ocmulgee River is about 350 miles; at of the Oconee, 300 miles; and of the Altamaha, 140 miles. Ma- n is at present the head of useful navigation on the Ocmulgee, and s distance from the forks is 203 miles, while Milledgeville occupies corresponding position on the Oconee at a point distant 147 miles om the forks. This makes the navigable portion of the system 0 miles in length.

The Ocmulgee River drains an area of about 6,200 square miles, of hich two-fifths lies above Macon. The Oconee drains about 5,400 uare miles, of which about one-half is above Milledgeville. The ltamaha drains about 3,000 square miles, making the total area ained by the system about 14,600 square miles. As the rainfall is nple, the discharge of the rivers is considerable, and is sufficient for e purpose of navigation and is well maintained. The mean surface pe of the two tributaries is about 1 foot to the mile; that of the tamaha something less than 8 inches.

For about 7 miles below Macon the Ocmulgee River has an average dth of 250 feet, and the banks are high enough for purposes of ltivation. Below this it enters a swamp, becomes very crooked. d has a width of from 100 to 200 feet, gradually widening down Hawkinsville, a little more than one-third the way to the mouth, ere its width is about 300 feet. The width of the Oconee River from 200 to 300 feet, the narrowest portion being found in the amp section midway of its length. The general width of the ltamaha is from 400 to 500 feet, though it occasionally narrows wn to half this distance. This is sufficient to show that the rivers e large enough for useful navigation. They have, in fact, been der improvement for a third of a century. For the last 20 years ey have been improved under a project having for its object to pro- de and maintain a navigable channel 3 feet deep at ordinary sum- r low water throughout the entire length of the system. This is be accomplished by cutting through rock shoals and sand bars, ilding dikes and training walls, protecting caving banks, closing cipient cut-offs, and removing snags, sunken logs, and bowlders om the channel and overhanging trees from the banks.

With the exception of a few miles near the upper limits of naviga- n and at a few rock shoals at detached points along the rivers, the tural depth is all that is required by the project. The greater rt of the improvement has consisted in the removal of snags, mps, logs, and overhanging trees. The records show that during e past 20 years nearly 60,000 snags and stumps have been removed om these rivers and more than 200,000 leaning trees and logs have

Digitized by Google

been cut from the banks. Of course, all of these obstruction not exist at the outset. Much of this work represents the ma nance necessary to the preservation of navigation, and which continue to be necessary as long as the swamps exist and the b are subject to caving and are covered with trees.

Upon the Ocmulgee and Oconee Rivers, near the upper lim navigation, the banks are high and sandy and are very easily er With every freshet the banks are cut and a large amount of making material carried into the streams, which the low-water rent is unable to remove. The ordinary forms of light contra works have not been altogether successful in effecting a perm improvement, but have rather tended to build up the bottom a raise the low-water level. Systematic bank protection will c this source of bar-making material and the river will tend t prove itself. It may have to be assisted and directed by a c amount of dredging.

Lower down, where the rivers enter the swamps, the banks are low and heavily wooded with cypress and hardwood trees. swamps are said to be from 2 to 5 miles in width, and are reali flood planes of the rivers, for as soon as they rise 3 or 4 feet th rent begins to flow through the swamps, following the general of the valley instead of the crooks and turns of the stream. action probably diminishes the erosion of the banks, though it to form cut-offs, of which a number have occurred, and alway bad effect upon the channel.

Still lower down the rivers have cut their way down in plac horizontal stratum of soft limestone rock, which offers more r ance to erosion than the banks. At such places they are abnor wide and, of course, very shallow, but elsewhere the general de considerably greater than the project requirement.

I am of the opinion that the rivers would offer no great diff to securing a depth, at ordinary summer low water, of 4 feet, or haps more, and this increase would be of very great advanta navigation.

These rivers have been used extensively for the transportat lumber in rafts, but the gradual exhaustion of the kind of t suitable to rafting is diminishing the amount of business of kind. In the calendar year 1908 there was transported in raft the rivers 66,607,000 feet b. m. of lumber, having a value of $ This material originated about equally on the three rivers, and than two-thirds of it was carried down over the Altamaha mouth. There are 10 steamboats navigating the rivers, and carried last year 51,000 tons of freight, having a value of $2,000,000. A part of this freight was carried all the way Brunswick, Ga., to Macon, at the head of navigation on the O gee. The improvement already made upon the rivers has b great advantage to steamboat navigation, and this navigat gradually increasing and will continue to increase as the coun settled up. It is considered that the work done in the last yea resulted in a saving of 12½ per cent in the freight rates bet Hawkinsville and Macon, on the Ocmulgee River.

Although these rivers have been under improvement for so time, there has never been a complete and accurate survey ma them. Twenty years ago a survey was made and a map print

Digitized by Google

the money available for the survey was very small in amount, and the expenditure was only about $6 a mile for the entire work, an amount not sufficient to give complete and accurate data. A compass and stadia line was run down over the rivers. A few soundings were taken and the elevations were determined by reading the bubble on the transit. A great many changes have since taken place in the rivers, due to the caving of the banks and to natural cut-offs, so that the maps, such as they are, do not represent present conditions.

I am of the opinion that the rivers are worthy of a good survey, upon which plans could be based and estimates prepared for such further improvement as the rivers are susceptible of by the methods of regulation. It will be necessary to cover about 500 miles of river, since the survey should be extended a few miles above the recognized heads of navigation in order to develop the location and extent of the caving banks. Proper work can not be done for less than $30 a mile, and I am of the opinion that $15,000 should be allotted for this survey.

Very respectfully, your obedient servant,

DAN C. KINGMAN,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., August 9, 1909.

Respectfully returned to the Chief of Engineers, United States Army.

These rivers have been under improvement since 1875. Since 1890 work has been carried on under projects having in view a navigable channel 3 feet deep at ordinary summer low water, to be accomplished by cutting through rock shoals and sand bars, building dikes and training walls, protecting caving banks, closing incipient cut-offs, and removing snags and sunken logs and bowlders from the channel and overhanging trees from the banks. On the existing and original projects there has been expended about $685,000 and the proposed depth has not yet been secured.

From the within report, supplemented by additional and more detailed information furnished by the district officer, it appears that a revision of the existing project is desirable, and that a survey, which is recommended by him, may develop means of securing better navigation facilities than can probably be obtained under the existing project, which is reported by the district officer to be lacking in efficiency and economy.

These rivers are of considerable commercial importance, and in the opinion of the board the interests involved are sufficient to justify an investigation of their needs and a determination of the advisability of further improvement. It is therefore recommended that the survey proposed by the district officer be authorized.

For the board.

D. W. LOCKWOOD,
Colonel, Corps of Engineers,
Senior Member of the Board.

Digitized by Google

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS.
Washington, August 16, 19

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Altamaha, Oc and Ocmulgee Rivers, Ga., authorized by the river and harbor of March 3, 1909.

Inviting attention to the report of the Board of Engineer Rivers and Harbors in the preceding indorsement, I recommend a survey of the locality, as proposed, be authorized.

FREDERIC V. ABBOT.
Acting Chief of Enginee

[Fourth indorsement.]

WAR DEPARTMENT.
August 17, 19

Approved.

JOHN C. SCOFIELD,
Assistant and Chief Clerk.
For the Secretary of War in his abse

SURVEY OF ALTAMAHA, OCONEE, AND OCMULGEE RIVERS.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Savannah, Ga., July 3, 19

SIR: In compliance with instructions contained in depart letter of June 23, 1909, I have the honor to submit herewith th sults of the survey of the Oconee, Ocmulgee, and Altamaha Ri Ga., which was called for by the river and harbor act of Mar 1909.

The survey was authorized in consequence of a favorable re resulting from a preliminary examination. Field work was b October 15, 1909, and completed November 30, 1910. Since time the maps have been plotted and the report prepared.

The survey cost $18,500, and as the distance covered was a over 500 miles, the expense has been something less than $37 per for field and office work. The results of the survey have been pl to a scale of 1:10,000 and the charts, which number 39, are of form size, 14 being of the Altamaha River, 12 of the Oconee R and 13 of the Ocmulgee River. The work was done under the mediate supervision of Assistant Engineer E. R. Conant, and h port is transmitted herewith. His report is quite complete, a is recommended that it be printed as part of the general report describes in detail the manner in which the survey was made discusses the results obtained; it furnishes a general descriptio the river system and its drainage basin, and gives a history of improvement of the rivers and the commerce which has been veloped upon them; it discusses the costs of the various degre

Digitized by Google

nprovement by regulation between limits which are fixed by :onomy and efficiency, gives the results which would probably follow rational improvement, and furnishes information as to the time iat would be required for its accomplishment.

Since the main purpose of the survey was to determine definitely hether the project of improvement now in force is best adapted to ie requirements of the streams, whether it goes as far as it is best) go, and how much it is going to cost to complete a suitable imrovement, I propose to limit my discussion to this—that is to say, ie proper method of improvement to be adopted, the degree to which should be carried, the results in the way of increased commerce hich may reasonably be anticipated from it, and the time that will e required to make it.

The Altamaha River is formed by the junction of the Oconee and)cmulgee Rivers. The whole drainage basin, about 15,000 square iiles in extent, lies in the State of Georgia. The general course of ie river is to the southeast and it empties into the Atlantic Ocean bout midway of the Atlantic coast of Georgia. The navigable poron of the river lies upon the coastal plain. The sources are in the roken ground above it. The length of the Altamaha River, followig its windings from the mouth of the southern branch of its elta to The Forks, is 144 miles; of the Oconee to Milledgeville, 145 iiles; and of the Ocmulgee to Macon, 205 miles. This length, 494 iiles in all, constitutes the navigable portion of the system. Above ie cities of Milledgeville and Macon lies a very considerable portion f the drainage basin and the length of the rivers above these two oints is, in each case, a little over 130 miles, but this upper portion torrential in character and not suited to navigation.

From the very earliest history of the country this river system has en recognized as a valuable route for inland commerce and worthy f improvement. As early as 1763 the Province of Georgia attempted) make provision for keeping clear the channels of its rivers by setng aside certain fines and forfeitures for this purpose. In 1817 ie State of Georgia appropriated the sum of $10,000 for the improveient of the Ocmulgee River; in 1826 it appropriated $30,000; and 1 1836 and 1837, $20,000 more. All of these appropriations were exended under the direction of commissioners. The improvement of he Oconee River was begun by the State as early as 1815 and up to 842, $45,000 had been expended. In all, about $115,000 was appropriated and expended upon these rivers by the State of Georgia rior to the Civil War. These appropriations were scattered over a ood many years and the amount, in the aggregate, was small when ieasured by the quantity of work to be done, although it was large or the State to provide at that time. Not very much good could iave been accomplished by the expenditure of this money, aside from he temporary relief afforded by the removal of snags and similar bstructions.

About 1876 the United States took up this improvement. The irst project was to secure a navigable depth in the river system of feet at ordinary low water. After expending about $190,000 upon his project of the United States in 1890, after another reconnoissance of the system, reduced the project depth to 3 feet at ordinary summer ow water. Since that time the work has been carried on with this end in view. The total amount appropriated by Congress has been

Digitized by Google

$879,250, of which $67,000, in round numbers, was unpledged and available on June 1, 1911, making the actual expenditure in a period of 35 years, for all purposes, $812,000, in round numbers. There is on hand, or in process of construction, for the payment of which allowance has been made, vessels, tools, and appliances to the value of about $45,000. This includes a snagboat, a 10-inch pumping dredge with pipe line and pontoons, a steam hoister, a pile driver, and sundry small boats and barges. The total amount actually expended by the United States for all purposes of improvement and maintenance of this 500 miles of river is, therefore, about $42 per mile per annum. The work done consists in the removal of more than 80,000 snags and 6,000 stumps from the channel, 267,000 overhanging trees from the banks, and 30,000 cubic yards of rock from shoals. In addition, 20,000 cubic yards of sand, clay, and gravel has been removed from false points, shoals, and cut-offs; 3,200 linear feet of training walls and spur dams have been built, and 11,000 feet of bank revetment have been constructed.

When the improvement was commenced by the United States the Ocmulgee River, above Hawkinsville, was unnavigable, and the same may be said of the Oconee River above Dublin. Navigation was only attempted for eight months during the year, and at other times the passage even of rafts was prevented by the rock shoals and snags. Now, the season has been greatly lengthened and the project of 1890, except for a distance of about 50 miles on the Oconee River, immediately below Milledgeville, has been practically completed. But the accomplishment of this limited measure of improvement has failed to develop any useful through commerce. Commerce over certain portions of the rivers has been encouraged and is carried on to quite a large extent and with profit to all concerned, but even this is hampered at times by shoal water; and the through commerce, which ought to be the most valuable of all and the most efficient as a regulator of freight rates, has failed to be established on a permanent or paying basis. The reason is obvious enough. Freight can not be carried for 350 miles or more upon a crooked river affording a draft of only 3 feet. The amount that can be carried upon a boat is not sufficient, at reasonable rates of freight, to pay for the cost of operating the boat upstream over this long distance. Unless a greater depth than this can be secured, the idea of through navigation will have to be abandoned and the value of this river system as a freight carrier will be greatly restricted and reduced.

Now, as to the survey. The first thing to do was to fix a reliable datum plane. A datum which can be described as "ordinary summer low water" is too indefinite for the accurate planning and execution of work. Fortunately, certain gauges have been established and read for a number of years on the Altamaha system by the Weather Bureau. These gauge records have been carefully considered and discussed, particularly for a period of 10 years, beginning with 1901. From these a low-water datum was fixed for Macon at a reading of 1 foot on the established Macon gauge, and a corresponding point on the gauge at Dublin at —0.9 of a foot. The gauge records indicate that the level of the water was above this Macon datum for not less than 95 per cent of the time, and above the Dublin datum for about 96 per cent of the time. Taking other places like Milledgeville on the Oconee, Hawkinsville, Abbeville, and Lumber

Digitized by Google

City on the Ocmulgee, and certain known points on the Altamaha, where gauges have been kept, the datum plane could be extended, and from the survey, by means of the large number of gauge readers and the system of levels carried down the river, the level of the datum was fixed and made available for future reference by 237 bench marks. This gives a surface to which all soundings are referred. It may be stated that this surface is about 1 foot lower than the rather ill-defined datum which has been heretofore in use, so that, in speaking of any given depth, referred to the new datum, it will mean a water depth, at any given stage, about 1 foot greater than when referred to the datum heretofore employed.

This discussion of the levels and the datum develops the fact that the surface slope of the waters of this river system is extremely moderate. On the Altamaha River, from the vanishing point of the tides, for a distance of 103.5 miles to The Forks, the mean slope is only .86 foot a mile and it is quite uniform. There are a few short stretches of a few hundred feet in length where the slope is 2 or 3 feet per mile, but this is insignificant and offers no obstacle to navigation. On the Ocmulgee River the mean slope, from The Forks to Macon, is 0.94 foot and is remarkably uniform. The steepest slope anywhere is at Buttermilk Shoals, a mile above Hawkinsville, where for one-fifth of a mile it falls at the rate of about 5 feet to the mile. On the Oconee River the mean slope is slightly greater than 1 foot per mile, and the maximum slope for a very short distance is the same as on the Ocmulgee River. The discharge of the Ocmulgee River at Macon, as determined by the United State Geological Survey for a stage of 1 foot, which is the assumed datum plane, is 750 feet a second. At Milledgeville, on the Oconee River, for a stage of 1 foot it is 630 feet and the discharge increases rapidly as the gauge rises.

Now, making use of this new datum surface, a study of the results of the survey shows this. There are 10.2 miles in the river system where the depth of the water at 0 of the new datum would be less than 3 feet for a channel of navigable width. This is about 2 per cent of the entire distance. There are 30.7 miles where the channel, under the same circumstances, would have a depth of less than 4 feet, and this is about 6 per cent of the entire distance. There are 80 miles where, under similar circumstances, the depth would be less than 5 feet, and this is about 16 per cent of the entire distance. It is easy to see that this depth passes the limit of reasonable and certain improvement by dredging. To deepen as much as 16 per cent of a river would probably lead to a lowering of the water surface, even in a stream of as gentle a current as the one under consideration; but if the channel was not made too wide the dredging of 6 per cent of the length would not be dangerous, particularly when the increase of depth for two-thirds of this distance would be less than 1 foot.

In considering the character of the material to be removed, the survey shows that 25.3 miles would be through earth and that 5.4 miles would be wholly or partially in rock. For the purpose of computation, it is assumed that the dredged section in earth will be 75 feet wide, without side slopes, and with an excess depth of 1½ feet to allow for filling in by the formation of stable slopes; and in rock it will be 60 feet wide, with vertical slopes and 1 foot excess depth. This makes, in round numbers, 940,000 cubic yards of earth and

Digitized by Google

116,000 cubic yards of rock to be removed. The rock is not hard and is often found broken up into bowlders, requiring no blasting. Actual experience in removing some 30,000 yards has justified an estimate of $1.10 per yard, exclusive of the first cost of the outfit. Less definite information exists as to the cost of earth removal, but with the amount to be done, it can be safely estimated at 15 cents per yard, if handled by a Government hydraulic dredge, this estimate not to include the first cost of the plant. The cost of rock removal, therefore, for the 4-foot project would be $127,600 and of the earth removal $141,000, making in all $268,600.

It will be desirable and necessary, particularly on the upper portions of the rivers, to make some provision for regulating works and for bank protection to diminish the annual cost of maintenance. Three thousand two hundred linear feet of training walls and 11,000 feet of bank protection have already been constructed. The general character and apparent stability of this work is shown upon the accompanying photographs in Appendix A. It is difficult to say in advance exactly how much of this work will be required. Some will, undoubtedly, be built in the future as part of the regular maintenance, but it is estimated, at the outset, that 32,500 linear feet of revetment work could be advantageously constructed in the system, and about 16,000 feet of training wall could be used for closing island shoots or contracting abnormally wide reaches. The materials of which these things are made are found close at hand and may be had at small cost, and experience has indicated that $3.50 per running foot will build the training walls and $2.50 the revetment, not including the first cost of pile drivers, barges, etc. This makes the cost for bank protection and regulating works about $137,000.

Snagging operations are and always will be necessary as part of the work of maintenance, and there is, in addition, a good deal of original work of this character that will have to be done to put the rivers in good condition. This is a work than can not be hurried. The best work is done during the short periods of abnormally low water. I estimate that $20,000 per year for snagging, for a period of five years, is necessary, exclusive of the cost of snag boats; one of these boats is on hand and another should be purchased. This will accomplish the removal of all of the old snags that are troublesome and the maintenance of the work during the five years of construction. This estimate will also cover the cost of opening and closing cut-offs. There are about 20 of these threatened cut-offs that should be prevented and possibly 4 or 5 well-advanced ones that might better be opened and allowed to become the channel of the river. The performing of this work can be done mainly by the crews of the snag boats. Therefore, I would estimate as follows:

For plant:

1 additional snag boat	$20,000
1 steam hoister, with Haywood bucket, steam drills, etc	15,000
1 dredge (either of the hydraulic or dipper type, as experience during coming year may indicate to be best)	23,000
2 steam or gasoline tenders for plant, $4,000 each	8,000
10 small barges, $350 each	3,500
1 pile driver	2,500
Total	72,000

Digitized by Google

We should then have:

For earth removal	$141,000
For rock removal	127,600
For regulating works and bank protection	137,000
For snagging	100,000
For plant	72,000
Total	577,600
To which should be added 10 per cent for contingencies	57,760
Total cost of the proposed work	635,360

This is to accomplish a depth of 4 feet below the datum herein described. This means practically a depth of 5 feet below the datum which has been heretofore used. It means an actual depth of 4 feet or better for 95 per cent of the time, a 5-foot depth or better for 88 per cent of the time, and a 6-foot depth or better for 75 per cent of the time. This is sufficient to permit a useful through commerce to be established and carried on if the business is there.

The work, in my opinion, should be carried out in five years, the first appropriation being for $155,360, to enable the necessary plant to be procured, and the others to be in four equal annual installments of $120,000 each. Provision would have to be made for the annual maintenance of this improvement after its completion. For the first few years, at least, it would be necessary to keep one dredge and one snagboat in operation, and to expend not less than $5,000 per annum in the maintenance of the training walls and bank revetments. The snagboat will cost, to operate, about $12,000, and the dredge about $18,000, and this, with the maintenance of the regulating works, makes $35,000 in all. It may be possible to reduce this after a few years.

Now, as to the commerce to be benefited. There was actually carried on the river in steamboats, in the year 1910, approximately 55,000 tons of freight, valued at $1,865,000. None of this was through business. It was very useful and very valuable commerce, but the ton-mileage was not very great, probably not exceeding 1,316,000 ton-miles, but on this short haul the rate per ton-mile was probably high. Apparently, it exceeded 1½ cents. An improvement which would nearly double the freight-carrying capacity of boats ought to effect a saving of at least one-third this amount, or approximately $7,000 per annum on the amount carried. This is not very great, but the principal shippers and users of the rivers indicate very clearly their belief that the business would greatly increase with the improvement of the streams. This estimate varies all the way from 50 per cent to 1,000 per cent, and the general opinion seems to be that the immediate increase would be no less than 100 per cent. There is apparently a very large prospective business in hardwood and hardwood products whenever the condition of the river is such as to permit this material to be handled by water. Doubtless the increased annual tonnage from this source alone would be greater than the total amount of freight of all kinds now carried by boats. The rafting on the river, which is large and valuable, would not be greatly benefited by the improvement.

There are 24 counties which border on the navigable portion of this system. The assessed valuation of real estate in these counties

Digitized by Google

is $55,000,000. The population, by the last census, is 415,483, and shows a gain of 20 per cent in the last decade. There is no town in this region exceeding 40,000 inhabitants, and all but one of them are much smaller. The population is rural. Farm products for the year 1910 exceeded $36,000,000 in value. These are products that have to be moved to be marketed, and there is the source of a large freight business here. Through business is, of course, the most valuable as a freight regulator and freight saver. From quite accurate and complete information furnished by the Macon Chamber of Commerce, it appears that the annual freight movement to and from that city is 2,000,000 tons, one-half of which is directly to and from the seacoast. It is generally conceded that at least one-third of this could advantageously be carried by boat. If it were carried by boat cheaper than by rail, it ought to fix the rate charged for the whole. If only 10 per cent of the rates at which this 300,000 tons is carried to and from the coast were saved, it would amount to an annual freight reduction of about $100,000. This would be enough to pay the cost of annual maintenance, to pay an interest of 4 per cent on the entire cost of the improvement, and to furnish a sinking fund which would extinguish the whole indebtedness in less than 20 years. This makes no allowance for the through business furnished by Milledgeville, Dublin, Hawkinsville, Abbeville, Lumber City, and other incorporated towns, to say nothing of the 150 landing places where freight is now received or shipped, to some extent, along the river.

It seems to me that there is now enough business in sight to justify the improvement as a strictly business undertaking, without considering what will result from growth and increased production due to increased facility of transportation.

Wharves and terminal facilities.—At present the navigation of the rivers is in too primitive a condition for much to be expected in the way of these facilities. There are, generally, sufficient wharves or landing places and warehouses in the cities or towns, to which the public has reasonable and equal access. At many of the other landing places some kind of a building or shed is erected for sheltering freight which has been received or is awaiting shipment. Photographs in Appendix A give an idea of the character of these facilities, such as they are. They also give an idea of the style of boats used on the river. I believe that sufficient public interest exists in the improvement to force the towns and owners of landings to provide better facilities when the increased business resulting from the improvement demands them, and that no special legislation on this point is necessary at this time.

The question of drainage, or land reclamation, is another matter, and a very serious one. The flood-plane of the river system is not, in general, very wide. At certain places on the upper Oconee and Ocmulgee Rivers it is 3 or 4 miles in width, but the average width along these two rivers is not more than six or seven thousand feet, and on the Altamaha perhaps 13,000 feet. The river winds through this plane, touching, from time to time, the high ground on either side, and the total length of the river, measured along its channel, is about 1.7 times as great as the airline distance. Along the Altamaha River, above the tidal section, the banks have a height of from 6 to 10 feet above the established datum. The average height is

Digitized by Google

perhaps 8 feet. Upon the Ocmulgee River, for the first 100 miles, the average height is about the same as upon the Altamaha; for the next 95 miles it is 3 or 4 feet higher, and for the 10 miles immediately below Macon the banks are from 14 to 20 feet high. There are many low places along both rivers, where the bank height drops from 4 to 6 feet above low water. Upon the lower half of the Oconee River the bank height is about 8 feet, then there is a section where it is as much as 16 feet, and at the upper portion the average height is 15 feet. The highest ground is upon the immediate crest of the bank, which slopes downward from 2 to 4 feet as it recedes from the river. All of this area is known as swamp, and is heavily overgrown with cypress or hardwood timber. As soon as the river rises a few feet it begins to flow out over the low portions of the bank and to fill the back of the swamp. As it gets higher, it spreads over the low bank and the course of the flow tends to depart from the crooked river and to follow the general slope of the valley. The actual velocity of the current in the channel which, at flood stages, can only be recognized by the fact that there are no trees in it, is generally less than at an ordinary bank-full stage. The advance of the crest of the flood wave is surprisingly slow, amounting, on the average, to only about 15 miles per day, for the whole river system. The swamp is, therefore, the great balance-wheel which holds the forces of the river in check. It does not occupy a very extensive area of land, after all, and the land is not wholly wasted. The timber that grows in the swamp is valuable and it will replace itself as rapidly as it is cut. Certain ground toward the edge of the swamp and the higher points within it can be cleared and cultivated at the risk of the occasional loss of a crop, but with the compensating advantage of constantly restored fertility, due to the overflow.

I apprehend that there would be no objection to draining any or all of this swamp land, either by open ditches or subsurface drains, in order to get the water off of it quickly after a freshet, and so render it fit for immediate cultivation. But the clearing should not be too general. Enough standing timber and underbrush should be left to break up the flow of the current to prevent the formation of cut-offs and secondary channels and to protect the surface soil from wash.

If ever this river system is leveed—in other words. if ever an attempt is made to take from the river that which rightfully belongs to it—an endless warfare will be started and the river will be like a giant unchained, which it will require a constant struggle to control. The Altamaha River system is not one that lends itself readily to control by levees. The Mississippi River south of Cairo is an ideal river for this purpose, because its immediate banks are the highest ground anywhere in the vicinity, and the river does not form the drain for the country adjacent to it. All drainage is back from the river, and the water is collected by a stream flowing parallel to the main river, but miles away from it—away out near the line of high ground or ground above overflow. Finally, when the Mississippi River, in its windings, approaches the high ground this lateral stream becomes a tributary. There are only a few such tributaries in the whole length of the Mississippi from Cairo to the Gulf. So the levees can be made almost continuous, being broken only at the mouths of these tributaries, and here the levees can be turned and run

Digitized by Google

up the banks of the tributary until they reach a point where the natural banks are above the level of the backwater.

In the Altamaha system the river is the lowest line of the valley, and the water of the rainfall drains directly into it. The drainage basin from the Macon-Milledgeville line to The Forks is about 80 miles wide, and from The Forks to tide level it averages about 26 miles, and the system receives as tributaries 292 good-sized brooks, creeks, or rivers in that portion of it which is here under consideration. These would give great trouble when levees were attempted. The smaller ones would have to be dammed off and forced to become tributaries of the larger ones, and these would have to be leveed far enough to prevent overflow by backwater. But without reckoning the cost and difficulty of this, the construction of the main levees alone would be a work of great magnitude.

In the freshet of 1887, which was one of considerable height and with regard to which more information is available than any other one, the water stood 25 feet at Macon, where it was pretty closely confined to the river bed. A few miles below, where the banks average 8 feet in height above low water, the flood height was only 16 feet, and at Hawkinsville, where the high ground comes in close to the river on both sides, the surface rose to 32 feet. This gives some idea of what would have happened between Macon and Hawkinsville if the entire river had been confined between levees as close together as the high banks at Hawkinsville. It would have required embankments 25 feet high, apparently, to restrain it. At Milledgeville, in the same freshet, the river reached a height of 37 feet, but dropped to 20 feet when the wide flood plane was reached, and rose again to 31 feet at Dublin, where the high ground approached the crest of the bank on both sides, and below this point it was from 15 to 22 feet. On the Altamaha River the maximum height was 19 feet, falling to 14 when the tide was reached. This shows that it would be a very serious matter and a very expensive one to attempt to levee the rivers. If the levees did not follow the windings of the river, but cut across from bend to bend, they would have to be from 1,400 to 1,900 feet apart, and the total length to be constructed along the main stream alone, not reckoning the length required for the tributaries, would be, in round numbers, 600 miles. It would seem necessary to build embankments at least 15 feet high to afford a reasonable protection, and they would cost, at the lowest estimate, $30,000 per mile. This would make them cost, in the aggregate, the sum of $18,000,000. While at present the velocity of the river is extremely moderate in time of freshet, if it were confined between artificial banks at no great distance apart the increased hydraulic radius would accelerate the velocity until the banks, which are now barely in a condition of stability, would be fiercely attacked, extensive caving would result, the levees would be constantly threatened or destroyed, and it would be necessary to be forever replacing them by new ones. The experience which has been had on the Mississippi River would be repeated here, without the justification that they have there of protecting enormous areas of land from overflow.

The rapid caving of the banks resulting from the increased flood velocity would be destructive to the navigation of the river as well

Digitized by Google

as to the levees unless the banks were protected. To protect them against the new and harder conditions which would result from levee building would cost a great deal more than under present conditions, and it could hardly be accomplished for less than $10 per running foot, or $50,000 per mile. Protection would have to be had, as a rule, either on one bank or the other, so that the length protected would be practically equal to the length of the river, and the protection would cost between $20,000,000 and $25,000,000, to which would have to be added the cost of maintenance. An expenditure of forty or fifty million dollars might reasonably be anticipated as the price of a general and permanent system of levees for the river.

It may be, and undoubtedly will be, asked that levees be built in certain localities for certain special purposes or to protect certain interests, but as soon as this is begun it is sure to lead to extensions, and as one bank of the river is leveed the property owners on the other side will be forced to rear banks for their own protection. The levee system on the Mississippi River began on a small scale and for special localities and increased until it became a great work, beyond the resources of the riparian States. I would, therefore, advise that the United States should have nothing to do with the construction of levees along this river system, and if ever the State of Georgia undertakes to build a system of levees or to permit them to be built, that the United States withdraw from all effort to improve navigation on the river or to maintain the improvement which has already been secured.

The foregoing discussion will apply to all of the large rivers that flow into the Atlantic Ocean from the States of South Carolina and Georgia.

Very respectfully, your obedient servant,

DAN C. KINGMAN,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 26, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The United States has spent about $190,000 on a previous project, and since 1890 about $690,000 has been appropriated on a project for a 3-foot depth at ordinary summer low water. This depth seems to have been practically obtained except above Hawkinsville on the Ocmulgee, where the depth is about 2½ feet, and above a point 15 miles above Dublin on the Oconee, where it is about 2 feet.

As a result of the survey a new datum has been established which is about 1 foot below the old one, so that existing depths according to this datum are 3 feet in the Altamaha, 2.5 feet in the Ocmulgee to Hawkinsville, and 1.5 feet thence to Macon, and 2 feet in the Oconee to a point 15 miles above Dublin, and about 1 foot thence to Milledgeville.

Digitized by Google

The district officer reports that a depth of 3 feet is insufficient to develop any useful through commerce, and recommends a 4-foot project referred to the new datum, estimated to cost as follows:

Earth removal	$141,000
Rock removal	127,000
Regulating works and bank protection	137,000
Snagging	100,000
Plant	72,000
	577,000
10 per cent for contingencies	57,760
	635,360

He states that this would give an actual depth of 4 feet or better for 95 per cent of the time, a 5-foot depth or better for 88 per cent of the time, and a 6-foot depth or better for 75 per cent of the time. He recommends that the work "should be carried out in five years, the first appropriation being for $155,360, to enable the necessary plant to be procured, and the others to be in four equal annual installments of $120,000 each. Provision would have to be made for the annual maintenance of this improvement after its completion. For the first few years, at least, it would be necessary to keep one dredge and one snagboat in operation, and to expend not less than $5,000 per annum in the maintenance of the training walls and bank revetments. The snagboat will cost to operate about $12,000, and the dredge about $18,000, and this, with the maintenance of the regulating works, makes $35,000 in all. It may be possible to reduce this after a few years."

The district officer states that there are 30.7 miles in this river system where the depth is less than 4 feet (new datum) for a channel of navigable width, which is about 6 per cent of the entire distance; that there are 80 miles where under similar circumstances the depth would be less than 5 feet and this is 16 per cent of the entire distance. He says:

> It is easy to see that this depth passes the limit of reasonable and certain improvement by dredging. To deepen as much as 16 per cent of a river would probably lead to a lowering of the water surface, even in a stream of as gentle a current as the one under consideration, but if the channel was not made too wide the dredging of 6 per cent of the length would not be dangerous, particularly when the increase of depth for two-thirds of this distance would be less than 1 foot.

It is noted, however, from the assistant engineer's report, that all except 1.5 miles of these 30.7 miles which require dredging for a 4-foot project is in the Oconee and Ocmulgee Rivers, which makes the percentage for these rivers 8.3. In the 16 miles immediately below Macon 6.8 miles, or 42 per cent, and in the upper 38 miles of the Oconee 8.5 miles, or 22 per cent, of the distance must be dredged—percentages which, according to the district officer's statement, are too great to make it safe to dredge without fear of lowering the water surface, particularly in view of the fact that these upper portions are presumably narrower than below. The mean width of the channel of the Oconee is 225 feet and of the Ocmulgee 235 feet. A dredged channel 60 feet wide and 4 feet deep with additions for overdepth and side slopes would certainly add a large percentage to the cross section of the stream and very materially alter the hydraulic conditions, resulting in a lowering of the water plane, a consequent

Digitized by Google

extension of the existing shoals or development of new ones, and a corresponding increase in the amount of dredging to obtain the proposed depth.

During the past 10 years the minimum discharge of the Ocmulgee at Macon varied from 270 cubic feet per second in 1905 to 1,170 cubic feet per second in 1906, with a mean of 736. With 1 foot on the gauge (assumed datum) it is 750. The discharge of the Oconee at Dublin, 68 miles below Milledgeville, during the same period was 560 cubic feet per second in 1904 and 1,800 cubic feet per second in 1906. At a stage of —0.9 (datum) it is 1,100 cubic feet per second.

A consideration of these conditions leads to a serious doubt in the mind of the board as to the possibility of securing and maintaining in the upper reaches a 4-foot channel by open river improvement, and the cost, even if it be found that the work could be done within that limit, seems greater than is justified by present and immediately prospective commerce. In fact, the amounts already appropriated and expended do not seem to be justified by the commerce actually developed, though as stated by the district officer it appears that commerce over certain portions of the river "has been encouraged."

For the reasons above given, the board is unable to concur in the recommendation of the district officer for an increase in the project depth to 4 feet, new datum, or even to recommend definitely a project for 3 feet at this datum, the cost of which is estimated by the assistant engineer at $324,225, maintenance not given.

It appears that the appropriations and allotments for this system of rivers for the 7 years 1905–1911 have totaled $275,000, or nearly $40,000 per year. These appropriations seem liberal when compared to the commerce involved, and the board does not believe that increased appropriations are justifiable. With the plant now on hand and under construction and appropriations as at present, the board believes that a considerable amount of permanent work of improvement can be accomplished in addition to maintenance of that already secured, and that the practicability of securing and maintaining a 3 or 4 foot depth can be more definitely determined. Could 3 feet (new datum) be secured to Macon and Dublin, or possibly to Milledgeville, there would be available, according to the district officer's statement, a 4-foot channel or better for 88 per cent of the time, and a 5-foot channel or better for 75 per cent of the time, on which local commerce would be provided for, and a considerable amount of through commerce might apparently be developed.

The board recommends that an annual appropriation of $40,000 be made for the continuance of work on these streams, to be applied to securing such additional depth as may be possible with such appropriation.

The question of drainage is discussed in the report of the district officer. In compliance with law the board reports that there are no questions of water power, terminal facilities, or other related subjects having any material bearing upon the improvement of these streams in the interests of commerce and navigation.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

Digitized by Google

REPORT OF ASST. ENGINEER E. R. CONANT.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., June 10, 1911.

SIR: I would respectfully submit the following report upon the survey of the Altamaha, Oconee, and Ocmulgee Rivers, Ga.:

The river and harbor act, approved March 3, 1909, provided for a preliminary examination of the Oconee, Ocmulgee, and Altamaha Rivers. Following the report upon this examination a survey was ordered of the Altamaha River from its mouth to the Forks, the Ocmulgee from the Forks to a few miles above Macon, and the Oconee from the Forks to a few miles above Milledgeville.

Actual field work commenced on October 15, 1909, and was completed on November 30, 1910, and with the exception of short periods the stage of the rivers was low and favorable for the work. During such periods when the stage was much above low water the hydrographic portion of the work was suspended until the water fell.

LOCATION.

The Altamaha River system is composed of the Altamaha, Oconee, and Ocmulgee Rivers with their tributaries, the Altamaha being formed by the confluence of the Oconee and Ocmulgee, and enters the Atlantic Ocean 12 miles below Darien, about midway between Savannah, Ga., and Jacksonville, Fla. This river with its tributaries is one of the numerous rivers on the Atlantic slope which have their source in the foothills of the Appalachian Mountain system, and for the most part run in a southerly or southeasterly direction to the sea. The Altamaha River, its tributaries, and their watershed lie entirely within the State of Georgia, and the Oconee and Ocmulgee have their source at the base of the Chattahoochee Ridge and flow in a southeasterly direction to their junction with the Altamaha.

GENERAL DESCRIPTION.

The headwaters of the Oconee and Ocmulgee Rivers are located in what is known as the crystalline area of Georgia and flow across the Piedmont Plain. The southerly boundary of the crystalline area is known as the "fall line." Above the fall line there are a succession of cascades with pools between same where the flow of the rivers is more or less sluggish. This section of the rivers, while offering opportunities for power development, forbids all practical navigation. Where the cascades stop, which is just above the fall line, begins the navigable portion of the river system, and thence the rivers wind through the coastal plain with a very gradual slope. Milledgeville, on the Oconee, and Macon, on the Ocmulgee, are located on the fall line; consequently these cities are at the head of practical navigation. As the rivers meander through the river valleys, the highlands bordering the valleys are touched by the stream first on one side and then on the other, so that numerous good landings are afforded. In this respect the Altamaha River system is unlike some of the other rivers entering the Atlantic seaboard, in that the valley of the Altamaha River system is much narrower than some of the others, and the landings are much more frequent.

The drainage basin extends about 250 miles back from the coast, in an air line, and has an area of 15,000 square miles. The two main tributaries of the Altamaha, viz, the Oconee and Ocmulgee, unite at a point 100 miles above the coast; and these main branches have a multitude of small tributaries. The main feeders of the Oconee River are designated as the Middle and East Forks, while those of the Ocmulgee are the Yellow and South Rivers.

The length of the Altamaha River, by following its windings, is 144 miles; of the Oconee to Milledgeville, 145 miles; and of the Ocmulgee to Macon, 205 miles. From Milledgeville to the headwaters of the Oconee is 137 miles, and from Macon to the headwaters of the Ocmulgee is 132 miles.

While there is one stretch on the Oconee and one on the Ocmulgee where the river is quite crooked, the Altamaha River system below the fall line is comparatively straight, the mean distance by following the windings of the rivers is 1.7 times the air-line distance.

The lower portion of the Altamaha River is affected by tidal conditions, the vanishing point of the tide being 41 miles above the mouth, or 33.5 miles above the mouth of the South Branch, the zero of mileage established for the survey.

At about 8 miles above Darien the river develops into several branches. The main branch enters the ocean at Altamaha Sound, the entrance to which is not

Digitized by Google

navigable on account of shallow depths and ever-changing shoals. Another branch passes by the town of Darien and the stream below same is known as Darien Harbor. Darien is a port of entry and vessels clearing from same pass through Darien Harbor and Doboy Sound and go over Doboy Bar to sea. Another branch, called the South Altamaha, enters the inside waterway at Buttermilk Sound, and this branch, together with the protected inside waterway from Buttermilk Sound to Brunswick, affords a sheltered route to river boats to this port, which is the logical point for the transshipment of freight from and to the coast. The improvement of Club and Plantation Creeks near Brunswick avoids the necessity of the passage of river boats over any exposed waters.

The southern portion of the coastal plain has distinct characteristics. The lower region bordering the Atlantic consists of flat country except in the vicinity of the rivers, and its elevation is from 15 to 25 feet above the sea. This extends about 20 miles inland and consists of sandy clay of very modern formation. This section is termed the lower terrace, and at the termination of this another strata is found which belongs to the Eocene period. This territory runs back about 20 miles to an abrupt termination with another tableland which is about 70 feet higher than the second. Each of these terraces is marked by its own botanical characteristics, prevailing forest trees and smaller plants, and the character of the bed and banks of the rivers is more or less different as the rivers meander through each terrace.

SURVEY.

The survey of the Altamaha, Oconee, and Ocmulgee Rivers commenced in October, 1909, and was completed in November, 1910. For a greater portion of the period there were three complete survey parties in the field, each consisting of a surveyor who was in charge of the party, 2 observers, 1 recorder, 1 gauge reader, and 1 leadsman, besides necessary labor, which usually consisted of 4 laborers for each party, excluding cook and cabin boy. Each party was quartered upon a substantial quarterboat. The survey commenced at the upper section, and as the work progressed the boat was dropped down the river with the current. No motive power was used upon the survey except to cover the lower tidal portion of the Altamaha. Gauge readers were employed at necessary points on the rivers to observe the changes in the heights of same as the survey progressed.

DATUM PLANE.

On the coast where the improvement of harbors is carried on, the reference plane is usually considered at "mean low water," which is readily determined by a series of high and low water readings. For rivers, the stage of which is variable according to the rainfall, the datum plane is usually established by assuming fixed elevations of the water surface at different localities, which elevations are usually referred to extreme low or ordinary low water stage. In order to establish a datum plane for a system of rivers similar to the Altamaha River system, it is necessary to have a long period of river heights observed at established points. Unfortunately the observation of the river heights on the Altamaha River system has only been kept for a reasonably long period at two points—Macon on the Ocmulgee, and Dublin on the Oconee. Gauge readings have been taken continuously at Macon for 18 years and at Dublin for 13 years; also at Milledgeville on the Oconee for 6 years; at Abbeville on the Ocmulgee for 7 years; and at Lumber City and Hawkinsville on the Ocmulgee for 2.5 years. Unfortunately, the early gauge readings taken at Macon can not be used with any reliability, as changes in the river bed just below Macon preclude a comparison of the early readings with those taken in recent years. The following tabulation of gauge readings is made from the observations taken at Macon and Dublin between 1901 and 1910, inclusive, a period of 10 years.

Digitized by Google

Date.	Macon.			Dublin.		
	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.
January	19.9	1.7	5.3	19.2	0.4	[illegible]
February	20.7	1.9	7.1	24.0	.6	[illegible]
March	22.8	2.4	7.5	25.8	.7	[illegible]
April	20.1	2.0	5.9	22.6	.7	[illegible]
May	13.9	1.3	4.4	20.8	.5	[illegible]
June	18.0	.7	4.5	18.7	—.9	[illegible]
July	15.4	.7	4.2	14.5	—1.0	[illegible]
August	17.2	—.1	4.5	23.2	—1.1	[illegible]
September	17.7	—.6	3.1	20.1	—1.4	[illegible]
October	18.2	—1.0	2.6	10.3	—1.5	[illegible]
November	15.0	—.1	2.5	10.0	—1.2	[illegible]
December	17.9	.8	4.5	16.1	—.5	[illegible]

From the above it is observed that the highest reading for 10 years on the gauge at Macon was 22.8 feet, and the lowest reading —0.6. The highest reading at Dublin for the same period was 25.8 feet, and the lowest —1.5. The mean gauge reading during this period at Macon was 5.7 feet, and at Dublin 4.4 feet. Taking a reading of 1 foot on the gauge at Macon, we ascertain from the gauge readings that during the 10-year period there were 187 days when the gauge read 1 foot or less, which is equivalent to 5 per cent of the entire period. Taking a reading of —0.9 foot on the established gauge at Dublin, we observe that there were 166 days when the gauge read this or less, which is equivalent to 4 per cent of the entire period. These two readings on the established gauges at Macon and Dublin have been taken as the low water establishment at these two places and constitute the datum plane for these two places. Taking other places, viz, Milledgeville on the Oconee, Hawkinsville, Abbeville, and Lumber City on the Ocmulgee, the Georgia & Florida Railroad bridge and Doctortown on the Altamaha, where gauge readings have been taken for greater or lesser periods, we established the same relative low-water heights at these points as at Macon and Dublin, by comparing simultaneous long low-water readings at all of these places for several periods of constant river stage during dry spells.

All depths taken during the survey are referred to the assumed datum plane, which, as near as can be fixed, allows for an expected stage of river for 95 per cent of the period which will be at or above the established low-water plane. Further, a study of the observations indicates that for 88 per cent of the period the rivers will be 1 foot or more above this datum, and for 75 per cent it will be 2 feet or more above same.

The rainfall on the Altamaha River system watershed is quite variable. Some years the stage of water on the rivers will not reach the low-water datum at any time. Other years pronounced droughts will occur which will cause extended periods of from 25 to 40 days when the river stage will be about a foot lower than the established low-water plane.

During the last 10 years the following low-water periods occurred: Between September 20 and November 4, 1904, a period of 46 days, the mean river height was 0.8 foot below the assumed datum plane. Between September 10 and October 10, 1905, a period of 31 days, the stage of the river was again about 1 foot below the assumed datum. The years of 1904 and 1905 were excessively dry. Other periods have occurred when for a duration of a few days the river stage was about 1 foot below the assumed datum.

The establishment of the datum plane described permitted of the reduction of the soundings, and this datum is used throughout where reference is made to improvements recommended and to estimates of material required to be removed.

MILEAGE.

The zero of mileage for local distances is, for the Altamaha River, the entrance of the South Branch into the Inside Waterway at Buttermilk Sound, for the Oconee and Ocmulgee, their conjunction with the Altamaha River at the Forks. The vanishing point of tide on the Altamaha River is 34 miles above Buttermilk Sound, or 29 miles above the town of Darien, which is on the Darien River branch. The conjunction of the Oconee and Altamaha Rivers is 137.1 miles above the zero of mileage. Milledgeville on the Oconee is 144.9 miles above the Forks, and Macon on the Ocmulgee is 205 miles

Digitized by Google

above same. On the Altamaha River the Seaboard Air Line Railroad crosses the river at mileage 23.5; the Atlantic Coast Line crosses at Doctortown, mileage 59.3; the Georgia & Florida crosses at mileage 135.9. On the Oconee River the Seaboard Air Line Railroad crosses at mileage 29; the Macon, Dublin & Savannah, the Central of Georgia, and the Wrightsville & Tennille cross at Dublin, mileage 77.8. The Central of Georgia crosses again at mileage 106.6. On the Ocmulgee River the Southern Railway crosses at Lumber City, mileage 11.8; the Seaboard Air Line crosses at Abbeville, mileage 95.9; the Southern and Wrightsville & Tennille cross at Hawkinsville, mileage 135.5; and the Southern crosses again at mileage 194.9. The Macon, Dublin & Savannah and the Central of Georgia cross at Macon.

HYDROGRAPHY.

Soundings.—The Altamaha River was cross sectioned from the mouth of the South Branch to the Forks, and its branches at the lower end to a point just below Darien. The Oconee River was cross sectioned from the Forks to 2.5 miles above Milledgeville, and the Ocmulgee River from the Forks to 5 miles above Macon. The spacing of the cross sections varied according to the character of the bottom and general depth of water found. On rock shoals the lines were run from 25 to 50 feet apart. On sand shoals the spacing was from 75 to 100 feet. Elsewhere it varied from 200 to 400 feet. A total of 190,629 soundings were taken, of which 66,042 were taken on the Altamaha, 74,090 on the Ocmulgee, and 50,497 on the Oconee. Where the general width of the river permitted, the lines were located by angle and stadia distance by one observer, but where the width of the river precluded adopting this method, locations were made by double intersection by two observers.

Reduction of soundings.—Sounding work was only carried on when the river was at a reasonable low-water stage, as the results obtained when high water existed would be inaccurate on account of the difficulties that would be encountered in the field work. In order to properly carry the low-water plane from point to point the following method was employed, which worked admirably and which permitted of the fixing of the local low-water stage at all points to probably within an error of not over one or two tenths of a foot.

At distances of not over 25 miles apart gauge readers were temporarily employed while the work was being carried on between the two points in question to take readings three or four times a day. Readings were taken simultaneously at the nearest point where the established low-water plane had been fixed, and by a comparison of the gauge readings the local low water established could be fairly well fixed at these auxiliary points. In order to fix the datum plane at all points between, a gauge was kept at all times by the houseboat and readings taken on same at various times during the day while soundings were carried on. The duration of time was observed while the houseboat was drifting from point to point, which seldom exceeded 2 miles, and as soon as it was again moored another gauge was set and readings resumed at the new location. While drifting a small correction was made by proper determination of the rise or fall of the river during the movement. In this way each increment of rise and fall was kept track of, and, starting with a known stage and recording the location of each day's work, the established stage could be determined for all points and the soundings reduced to local low water. In most instances when the houseboat reached a point whose datum plane had been previously fixed the accumulated error brought from the last fixed point would seldom exceed two or three tenths of a foot, which could be easily adjusted. A check on this method was had by the observer carefully taking water-surface elevations opposite all set-ups, after which these elevations were platted, as well as the fixed low-water plane, and by scaling the height from the low-water plane to the water surface from various points a reduction to low-water plane could be readily ascertained for all points.

TRAVERSING.

All distances were determined by stadia measurements. The rivers being more or less crooked and the banks covered generally with trees and brush, it was impracticable to adopt a triangulation system for locating the rivers. The traverse lines, however, run by stadia and azimuth were carried out with more than average precaution with first-class instruments. Distances between set-

Digitized by Google

ups were read by stadia backward and forward by the person running the traverse line, and these distances were also checked by the observer locating the cross-section lines, thereby eliminating danger of any considerable error. True north was obtained by observations on Polaris at distances of not more than 10 or 12 miles of survey, in order to make proper corrections for the convergency of the meridian, and in most cases after allowing for the convergence the azimuth checked at the points of observation within one to three minutes. Latitude and departure were computed for all points, so that platting of same could be done as accurately as possible.

LEVELING.

It so happens that the Geological Survey has run a precise line of levels from Morehead City, N. C., on the Atalntic, to Brunswick, Ga. A portion of this line was run over the Southern Railway, which parallels the Ocmulgee and Altamaha Rivers from Macon to Brunswick, the distance from the railroad to the rivers varying from one-half mile to 25 miles. A precise line has also been run by the Geological Survey from Macon to Milledgeville. The Geological Survey uses as their datum plane "mean sea level," whereas all elevations established by this office are referred to "mean low water at sea." The elevations of the Geological Survey bench marks at Macon and Milledgeville were adpoted for the survey after changing the elevations by adding 3.5 feet, so that they would be referred to mean low water at the mouth of the Altamaha River. In carrying the level line down the rivers a check on our work was frequently made by running side lines from the river to the Geological Survey bench marks established at various points along the Southern Railway. The closures upon the Geological Survey bench marks were, with one exception, within two or three tenths of a foot, and, considering the difficulties attending the work, speaks well for the leveler and the method adopted.

As the method of leveling was somewhat unique and the results so satisfactory, it is considered of sufficient value to outline same:

The method adopted, termed compensating leveling, was introduced here by Mr. W. C. Lemen, assistant engineer of this office, and had been previously used by him while engaged under the United States Engineer Office, St. Paul, Minn. This method is particularly adapted where there is not much range in elevation, as was the case on this survey where the lines were run along the river banks.

A transit with stadia wires and a good level attachment under the telescope is required. The shots can be made from one point to another at varying lengths, and the backsights and foresights need not be equal as is required with ordinary wye-level work. Any distance which can be read by stadia can be as readily used for a level shot. Starting with the initial point having a known elevation, the height of the instrument above this point is taken by any ready means. On the survey of the rivers this was determined by graduating one of the tripod legs and after allowing the plumb bob to just touch the point whose elevation was known, was swung to the leg, and the height of the instrument read from this scale. Where built stations were used the height of the instrument was determined by measuring the center of the standard above the bottom of the plate, and after being once obtained was constant. By the above measurement, which is termed the "H. I.," the elevation of the instrument, or "E. I.," is determined. A forward shot upon the next station is taken on the stadia rod, using the center hair of the stadia hairs and the level under the telescope. An initial elevation is thus obtained for station No. 2, the instrument is then moved up to No. 2, set up over same, and this new height of instrument is measured on the tripod leg, or otherwise, giving the value, or "E. I.," of station No. 2. A backsight is then taken from station No. 1, and another "E. I." is obtained. These two valuations, or "E. I's.," of the instrument may vary, and the mean of the two will be the correct "E. I." from which, if the height of instrument above No. 2 be subtracted, gives the correct or final elevation of the latter point. By this operation the refraction of the instrument, the curvature of the earth and the error of the instrument will be eliminated or compensated; and the only errors that can come into this are the errors of readings, incidental errors, and the personal errors of the observer, which, from the fact that two independent operations are gone through with to obtain the elevation of the instrument, rarely occur, and, if they do occur, are readily caught.

On an extensive survey it is advisable to use two rodmen, and, if this is done, to manipulate them so that the same rod is used for reading over any given length. For instance, if the instrument be over No. 2, rodman A goes to No. 3

Digitized by Google

and rodman B goes to No. 1. While the instrument is being carried from No. 2 to No 3, rodman A returns to No. 2, and when the instrument is set up over No. 3, rodman A gives the backsight to No. 2, while rodman B goes forward to No. 4 and gives the foresight. By this method if there be any slight difference in the length of the rods the same is compensated for. This method is described as applicable only upon level ground, but by an additional manipulation can be used just as well for rougher ground. Should the elevation of the forward stake be above the level of the instrument, or "E. I.," the upper stadia hair can be read upon the rod, should the rod be within the vision of the telescope when leveled; then, if the distance from that point be read upon the stadia rod, the elevation of the upper hair above the level line will be one-half the stadia interval, assuming that the center hair is midway between the upper and lower; otherwise the half interval used must be read upon the rod. This is termed "stepping up a half interval." Should the forward stake be more than a half interval above or below the level of the instrument, or "E. I.," the position of the upper hair when focussed at about the distance of the forward stake (avoid refocusing, as slight errors are incurred) can be noted upon any visible object and the instrument elevated by means of the vertical-motion tangent screw until the lower hair comes into the same position that the upper hair was noted to have been. The instrument has now been elevated through a vertical angle equal in feet to the stadia interval at the distance the forward stake (see p. 14) is from the instrument. And, by reading the position of the center hair upon the forward rod, the difference of this rod reading and the whole interval will give the height of the forward station above the elevation of the instrument. It can be readily seen that where this "stepping-up" process is repeated often, the more liability there is to small errors. In most cases where a "step-up" was necessary for the forward shot, a level shot could be obtained on the backsight, if within the length of the stadia rod used, and, when it was necessary to adjust the mean "E. I." by a "step-up" shot and a level shot, two-thirds of the difference of the "E. I's." was given to the "step-up" shot, and one-third to the level shot. This is entirely an arbitrary division found by long practice to give the best results.

Specimen of level notes.

Correct elevation.	Ver. "A."	Ver. "B."	M. E. I. and magnetic bearing.	Distance.	H. I. rod reading.	Elevation.	E. I.
	Station 200.						
244-78			249.21		4.43	244.76	249.19
Station 199	158-51-50	338-51-50		1,039	5.29	243.94	249.23
Station 201	40-36-00	220-36-00	S-39-W	1,179	6.61	242.60	
Water surface at 7.15 a. m.					7.68	241.53	
	Station 201.						
242-62			247.16		4.54	242.60	247.14
Station 200	220-36-00	40-36-00		1,180	2.40	244.78	247.18
Station 202	318-17-50	318-17-50	S-43-E	411	4.13	243.03	
Water surface at 7.35 a. m.					5.92	241.24	

In carrying the levels down the river 237 bench marks were established, of which 131 were left on the Altamaha, 50 on the Oconee, and 56 on the Ocmulgee. The elevation of each bench mark above mean low water at the mouth of the Altamaha River and above the local established low-water plane was determined. Also, as the survey proceeded, elevations of the water surface were taken at the time of each set-up of the instrument. Elevations of banks were also noted. All gauges set were leveled in, and elevations were taken of railroad bridges.

ELEVATIONS.

The elevation of low water at The Forks is 80.3 feet. At Dublin, on the Oconee, 154.1 feet; at Milledgeville, on the Oconee, 235.66 feet; at Carey, 54 miles above Milledgeville, 497 feet; at the headwaters of the Oconee, 826 feet. At Lumber City, on the Ocmulgee, it is 91.23 feet; at Hawkinsville, 193.76 feet; at Macon, 273.99 feet; at the junction of the Yellow and South Rivers, 55 miles above Macon, 501.5 feet; at the headwaters of the Ocmulgee, 878.5 feet. Above Macon the elevations given are from the Geological Survey records, and above Milledgeville, from an early survey made by the United States Engineers.

Digitized by Google

SLOPES.

Altamaha River.—The raise in the low-water slope for the tidal section of 41 miles is 9.4 feet. The high water slope is slightly upward, the total raise being 0.21 foot. From the vanishing point of the tide to The Forks, a distance of 103.5 miles, the total rise is 71 feet, which is equivalent to a mean slope of 0.68 of a foot per mile.

This slope is quite uniform, and if a straight line is drawn between the two limits specified above, the greatest deviation of the slope from this straight line would be 5 feet. Between the vanishing point of the tide and 20 miles above, the slope is 1 foot per mile, and for the next 84 miles it is 0.81 of a foot per mile. There are 2 or 3 short stretches of a few hundred feet each in length where the slope is 2 or 3 feet per mile.

Ocmulgee River.—The mean slope from The Forks to Macon is 0.94 foot per mile, and if a straight line were drawn between these two points, the greatest deviation between the slope and this straight line would be 10 feet. The steepest slope is found in a stretch of 56 miles below Macon, where it is 1.21 feet per mile and practically uniform. There are a few short stretches on the river where the slope is 2 or 3 feet per mile, and the steepest slope at any place is at Buttermilk Shoal, 1 mile above Hawkinsville, where for 0.20 of a mile it is at the rate of 5 feet per mile. Above Macon the mean slope of the river to its headwaters is about 5 feet to the mile, though this is very irregular, there being numerous cascades and pools.

Oconee River.—The mean slope from The Forks to Milledgeville is 1.07 feet per mile and is quite uniform. The greatest deviation from a straight line connecting these points to the natural slope is 10 feet. From mileage 102 to 121, where the river is narrow and crooked, there occurs the steepest slope for any section of the three rivers below the fall line, it being for this 19 miles 1.76 feet per mile, and is quite uniform. The steepest slope on the river is at Carrs Shoals, 3 miles above Dublin, where for 0.3 of a mile the slope is at the rate of 5 feet per mile.

TOPOGRAPHY.

The valley below the fall line through which the rivers flow is covered to a large extent with hardwood timber, and, in order to ascertain the acreage of the bottom lands, the swamp margins, or the division line between the river valley and the highlands, was located wherever practicable by traverse lines. Where this work would be very expensive on account of the depth and impenetrability of the swamps, estimates of the depth were obtained from the most reliable sources. The character of the timber found on the bottom lands was noted.

Local names were ascertained for all landings, reaches, various shoals, creeks, etc. The heights of banks were observed, and all railroad and highway bridges were measured in order to ascertain the clearance and type of construction. The locations and types of ferries were noted. All cut-offs and sucks were observed and memoranda taken of the condition of same in order to ascertain whether they should be opened or closed. The lower portion of the Altamaha River Valley on the east side is very wide and low. Sand ridges paralleling the river divide the valley into several well-defined swamps. There are openings through these sand ridges through which freshet water flows, which inundates a large territory. A special study was made of this locality, and is referred to later under "Drainage." Where the rivers pass cities and towns, sufficient topography was taken at these places to connect same with the river alignment.

HEIGHT OF BANKS.

Altamaha River—The lower portion of the Altamaha River, below Darien, meanders through salt-water marsh, the elevation of which is about 1 foot above mean high water. Above this stretch of river, as far as mileage 16, a large tract of land, approximately 20,000 acres, was once under the cultivation of rice, and dikes were constructed along the banks of the river with their elevations at about 9 feet above mean low water. At this time these are in bad condition, and in many places no signs of same exist. The elevation of the land once under cultivation is between 4 and 5 feet above mean low water The banks of the river from this point to The Forks have a height varying from 6 to 10 feet, the average height being 8 feet. Where the river touches the highlands, the elevation of the bluffs ranges from 20 to 40 feet.

Digitized by Google

Ocmulgee River.—The average height of the banks bordering the river for 100 miles above The Forks is 8 feet; for the next 95 miles the average height is 11.5 feet; and for 10 miles below Macon the average height is from 14 to 20 feet. There are a few short stretches where the heights would range from 15 to 20 feet. Also low places where the banks would not be over 6 or 7 feet. Bluffs on the river have elevations of from 15 to 60 feet.

Oconee River.—For the first 40 miles above the mouth the average elevation of the banks is 8 feet; for the next 34 miles it is 10 feet; from mileage 75 to 112 it is 16.5 feet; from the latter point to mileage 131 they are somewhat lower, averaging 10 feet; and for 12 miles below Milledgeville they are approximately 15 feet.

The elevations of the swamps back of the river banks are generally from 2 to 4 feet lower than the river banks.

WATERSHED.

The entire watershed of the three rivers is aproximately 15,000 square miles, divided as follows: Altamaha River, 4,000 miles; Ocmulgee River, 5,800, of which 2,300 is above Macon and 3,500 below; Oconee River, 5,200 miles, of which 2,800 is above Milledgeville and 1,400 between Milledgeville and Dublin, and 1,000 below Dublin.

VELOCITIES.

The slopes of the rivers below the fall line are very gradual, averaging 0.8 foot per mile for the whole system. The mean width of the channel of the Altamaha River is 450 feet; of the Oconee, 225; and of the Ocmulgee, 235. At certain localities wide reaches may exceed these means by 200 feet, and numerous sections exist through the flood plain on the Oconee and Ocmulgee below Milledgeville and Macon, where the mean width is 50 feet less than the average for the whole river.

The Geological Survey has obtained the velocities and discharge for various river heights, with precision, at certain points on the Ocmulgee and Oconee, and the data contained in this report as to velocities and discharge are taken from the reports of the Geological Survey.

The mean velocities of the three rivers at low water vary between 1 and 2 feet per second. At Macon the velocity at 5 feet above low water is 1.4 feet per second; at Milledgeville at the same stage it is 3.2 feet per second. On the Altamaha at this stage it is approximately 3 feet per second. At a stage of about 15 feet at Macon, Milledgeville, and Dublin the velocity is 4 feet. When the flood plain is reached, the discharge spreads out over the river valley and the velocity during ordinary freshets is very much reduced, being approximately 2.5 to 3 feet per second.

RAINFALL.

The mean annual rainfall over the Altamaha River system watershed is 49.5 inches. The driest months in the year are October and November. During this period of the year the rainfall amounts to 2.5 inches per month. April, May, and June follow with a rainfall of 4 inches per month. July, August, and September have a mean annual rainfall of 4.3 inches. December, January, February, and March have the greatest amount of precipitation, or a mean of 5 inches per month. The amount of precipitation has quite a wide range for the same months and is more or less irregular for various years.

DISCHARGE.

The discharge of the Oconee and Ocmulgee Rivers has been very well determined by the Geological Survey at Macon, Milledgeville, Dublin, and other points above the fall line. As the minimum discharge of the river controls the possible depth of improvement, there is no necessity for ascertaining the discharge with any precision at points below Macon and Dublin. The maximum discharge at Macon during the past 10 years ranges from 1,260 cubic feet per second in 1904 to 50,860 cubic feet in 1902. The minimum discharge during this period varied from 270 feet per second in 1905 to 1,170 cubic feet in 1906, with a mean for the minimum discharge of 736 feet. The mean discharge during the same period varied from 1,476 second-feet to 4,200 second-feet, the mean of the means being 3,322 feet. The maximum discharge at Dublin during

Digitized by Google

the last 10 years ranged from 1,150 cubic feet per second in 1904 to 34,200 cubic feet in 1908, the minimum being 560 feet in 1904 to 1,800 in 1908, the mean discharge for the 10 years being 5,250 feet. The discharge at Macon, Dublin, and Milledgeville for various readings on the gauge are as follows:

	Second-feet
With 1 foot on the gauge at Macon it is	7[illegible]
With 2 feet on the gauge at Macon it is	1,2[illegible]
With 4 feet on the gauge at Macon it is	2,[illegible]
With —0.9 foot on the gauge at Dublin it is	1,1[illegible]
With 0.0 foot on the gauge at Dublin it is	1,[illegible]
With 1.0 foot on the gauge at Dublin it is	2,3[illegible]
With 1.0 foot on the gauge at Milledgeville it is	6[illegible]
With 2.0 feet on the gauge at Milledgeville it is	1,6[illegible]
With 3.0 feet on the gauge at Milledgeville it is	1,93[illegible]

RUN-OFF.

The mean run-off in second-feet per square mile of the drainage area above Macon is 1.37 feet. From the best data obtainable the loss by absorption and evaporation over this drainage area is 40 per cent, but it is estimated that in the flat sandy country bordering the lower portion of the rivers that this loss is equal to or greater than 50 per cent. The run-off per square mile above Dublin on the Oconee is slightly less than on the Ocmulgee above Macon, but sufficient data is not at hand for determining accurately the loss by absorption and evaporation. In the vicinity of and below Dublin there are quite a number of deep-seated springs which supply the river with considerable flow, even during the low-water period.

FRESHETS AND THE PROPAGATION OF SAME.

Height of freshets.—While the sources of the Oconee and Ocmulgee Rivers are not in the high mountainous section, yet the slopes of the rivers above the fall line and of the hillsides bordering the rivers are such that there is a rapid flow from the numerous tributaries into the rivers during heavy rains, with consequent high waters. A freshet occurred in 1887 whose height was observed at various places on the three rivers. While perhaps this freshet is not the highest that has ever occurred, yet it is the only one of great height of which accurate records have been obtained. The height of this freshet referred to the low-water plane at various points, is as follows: Macon, 25 feet; at a point 12 miles below in the flood plain, where the valley is very wide, the height was only 16 feet. As the freshet reached the narrow valley it increased from 20 feet at the upper end of same to 32 feet at Hawkinsville, and between this point and The Forks it fluctuated between 16 and 22 feet, according to the height of the banks and the width of the valley. At Milledgeville on the Oconee it reached a height of 37 feet, which was reduced to about 20 feet when it reached the wide flood plain 15 miles below. At Dublin it was 31 feet high, and from this point to The Forks it varied from 15 to 22 feet. On the Altamaha it ranged from 19 to 22 feet until the tidewater was reached, where the height was reduced to 14 feet. Below the vanishing point of tide to Darien the freshet was affected by tidal conditions, the height at Darien being about 11 feet above low water or 5 feet above high water.

Propagation of freshets.—The propagation of freshets has been fairly well determined. On the Ocmulgee between Macon and Hawkinsville the propagation of the freshet crest is 14.3 miles per day, between Hawkinsville and Abbeville 17 miles, and between Abbeville and The Forks 21.6 miles per day. The smaller velocity between Macon and Hawkinsville is due to the crookedness of the river and the wide valley, with low banks extending for a portion of the distance between these two points. On the Oconee River the velocity is quite uniform throughout and is approximately 16.5 miles per day. On the Altamaha River to tidewater the velocity is somewhat less, being about 15.5 miles per day. The mean velocity for the three rivers below the fall line is 16 miles per day. Above the fall line the velocity of propagation depends a great deal on the locality of the rainfall. Sufficient data has not been accumulated to show the propagation of the freshet over the steeper sections of the rivers, but same can not be less than 50 miles per day.

Digitized by Google

The watershed of the Altamaha River system was originally covered with forest, which has been quite generally cut off, but unfortunately there is not sufficient data to show what action, if any, the denudation of the forest has had upon the freshets or discharge of the rivers. The available data does not show that the clearing of the forest has affected the mean annual rainfall of this section, but it is an established fact that before the denudation of the forest the water in the rivers was clear, even during freshet periods. As late as 1841 residents on the Altamaha River could distinguish whether a freshet coming down the river originated in the Oconee or the Ocmulgee watershed by the color of the water. The cutting away of the forest bordering the Oconee had advanced considerably at this time, and when a local freshet occurred in this watershed the flow from same into the Altamaha was colored by the red clay held in suspension. This shows that material brought from the upper sections of the rivers is carried a long distance, evidently being transported to some extent to the lower portions of the rivers. As soon as the clearing of the lands took place on the Ocmulgee watershed the waters of this branch also became turbid. Following the denudation of the forest from the clay lands and the clearing of the hillsides for cultivation cracks were formed in the earth by the sun's heat during dry weather and when rains occurred the rushing of water through the cracks would cause them to deepen at the bottom and in time deep ravines would be formed. The rapid formation of these ravines is shown by a single instance. Sir Charles Lyell, the English geologist, visited this country in 1846 and became much interested in the flow of rivers. He visited Milledgeville, Ga., and describes in his book the existence of a deep ravine located about 3 miles from the city, and stated that it had been formed within a period of 20 years, and that at the time of his visit there had a depth of 55 feet, about 900 feet in length with a width of from 20 to 100 feet. Upon one of my recent inspection trips I visited the site of this ravine and observed that it was much deeper, wider, and longer than it was when Sir Lyell inspected it. The detritus from this ravine, which is only a short distance from the Oconee River, to a large extent was carried into this stream. While this ravine is of unusual size, yet there are a large number of others formed in the red-clay sections bordering the Ocmulgee and Oconee Rivers which feed the rivers with a large amount of detritus during freshet periods.

PAST AND PRESENT CONDITIONS OF THE RIVERS.

Before the denudation of the forest the rivers were clear. Undoubtedly sand shoals did not exist to the extent that they do now, but there must have been the same conditions as regards caving banks where the rivers meander through the alluvial valley in the flood plain below the fall line, so that snags and logs and similar obstructions interfered with navigation. It has been reported that navigation was not as difficult on the rivers during the earlier periods of navigation as it was later on. To some extent this might have been true during certain stages of the river, but rock shoals that existed before they were improved existed when navigation was first carried on, and the controlling depth across these shoals before improvement was carried on was in many places not over a foot above the present assumed datum plane.

At the fall line the slope of the river changes suddenly from 4 to 5 feet per mile to less than 2 feet at an ordinary stage. The result of this sudden change causes the deposition of a certain percentage of the detritus brought down from the headwaters of the rivers to take place just below the fall line. And it is a fact that a series of sand shoals is found for a distance of about 10 miles below Macon and for about the same distance below Milledgeville. These sections of the rivers are confined within rather narrow widths by reason of high banks, and sufficient data is at hand to show that the sedimentary deposits cause a rise in the river bed. Comparing the recent survey of the Ocmulgee below Macon with earlier ones made at the same section, it is observed that there has been a rise in the bed of the river for 5 miles below Macon since 1889 amounting to 1.1 feet. It has been assumed that the construction of training walls at this locality caused the rise in the river bed. But just below Milledgeville, where no training walls have been constructed to change the regimen of the river, the rise in the bed of the river for 10 miles since 1889 amounts to about 2.5 feet. In conferring recently with Mr. McCallie, State geologist, I was informed that some of the reservoirs formed by the construction of dams at the headwaters of the rivers are filling up gradually on

Digitized by Google

account of receiving the detritus brought from the lands above. One particular instance is cited: Bull Sluice reservoir near Atlanta has been in use for about six years. It covers approximately 750 acres of land, and the storage capacity of this reservoir has been reduced during this period one-fifth by the accumulation of sediment.

When the lands bordering the upper rivers were first cultivated no attention was paid to terracing the side slopes, but of later years this method has been followed for the protection of the lands, and at this time the percentage of detritus brought into the rivers from the side slopes is far less than it used to be.

When the flood plain is reached the transporting of detritus into the channel from the surrounding highlands ceases and a good depth of water is found in the rivers which meander through these sections, notwithstanding the fact that the banks erode badly and the river is changing its alignment more or less all the time.

Below the flood plain, the lower limit of which is 50 miles below Milledgeville and 55 miles below Macon, a series of rock shoals is encountered on each river of about the same character of argillaceous and sandstone formation, usually stratified and not very hard. A portion of same consists of hardpan formation. These detached shoals extend for a distance of about 12 miles on each river. Below this rocky formation the rivers widen considerably, the general depth becomes greater, and sand and rock shoals are quite far apart. For a few miles just above the conjunction of the two rivers there is rather a shoal section on each river. When the Altamaha is reached a much greater width is found, excepting for a few miles through "The Narrows." Many wide reaches exist which cause a spreading out of the natural flow, which reduces the velocity, and sand shoals form at a few localities, although the general depth of the river is very good.

For perhaps 60 per cent of the rivers' lengths the banks are formed of pretty stiff clay, which stand abrupt to the water's edge. Where the rivers flow through the flood plain below Macon and Milledgeville the banks are soft, being composed of alluvial sand and clay intermixed, which is more or less stratified and is of recent geological formation. Where the rivers flow through the rocky sections in the vicinity of Dublin and Hawkinsville the banks are firm. Sections of the rivers elsewhere have, in places, numerous detached caving banks, and these are the ones which generally cause trouble by having the detritus eroded from same transported by the current below into the reaches, where it is deposited and forms sand bars.

The bed of the rivers is quite generally composed of sand, formed to a certain extent from the wash brought from neighboring plantations, in part from caving banks, and to a lesser extent from detritus brought down from the headwaters. Many of the rock shoals found below Dublin and Hawkinsville are of loose rock which have fallen into the river by the gradual washing away of the soft material which formerly underlay same. This rock is mostly of silicious sandstone.

DEPTHS.

The depths given are not the deepest along the line of best water, but are a mean of the soundings for a width of 60 feet deduced from the best channel. If a profile alone is considered the mean depth would be about 1.5 feet greater than those given below.

On the Altamaha River there is practically a 3-foot depth throughout. On the Oconee there is 6.7 miles which have less than this depth, of which 5 miles lie between the Central of Georgia Railroad bridge, 38 miles below Milledgeville, and Milledgeville. On the Ocmulgee for 3.7 miles there is a depth less than 3 feet, of which 2.5 miles is found just below Macon. Considering a 4-foot depth with 60-foot width it is found that there is 1.5 miles on the Altamaha with less than 4 feet, 17 miles on the Oconee, and 12.1 miles on the Ocmulgee. Considering a 5-foot depth, there is 5.2 miles on the Altamaha with a depth less than this, 37.5 miles on the Oconee, and 37.1 miles on the Ocmulgee.

From the above it is noted that there is a total of 30.6 miles on the three rivers with a depth of 4 feet or less, which is equivalent to 6.2 per cent of the total distance. However, 7 miles of shoal water is found just below Macon and 9 miles below Milledgeville. So that, for the three rivers, excluding the short sections below Macon and Milledgeville, there is less than 3 per cent of the distance which does not have a depth of 4 feet or more, referred to the established low-water plane.

Digitized by Google

RAILROADS.

Between the mouth of the Altamaha River and Macon and Milledgeville there are 10 railroad crossings, the locations of which were given under mileage. The Southern Railway parallels the Altamaha on the west side and the Ocmulgee on the east. The mean distance from the railroad to the Altamaha River is 8 miles, and from the railroad to the Ocmulgee it is 11 miles. No railroad parallels the Ocmulgee on the west side for any distance, nor the Altamaha on the east, nor the Oconee on either side. There are considerable sections of fertile territory where products have to be hauled by wagon from the plantations for from 10 to 14 miles to the nearest railroad station.

BRIDGES.

There are only two highway bridges over the navigable portion of this system of waterways, one on the Ocmulgee at Hawkinsville and one on the Oconee at Dublin. Both are equipped with draws. The one at Hawkinsville has a clearance of 37 feet at low water, and a clearance between piers of 84 feet. The one at Dublin has a clearance of 41 feet above low water, and a clearance between piers of 80 feet. Both are of steel construction. There are 4 railroad bridges on the Ocmulgee River, with clearances above low water ranging from 14 to 39 feet, and with clearances between piers varying from 74 to 90 feet. On the Oconee there are 3 with clearances from 24 to 41 feet, and clearances between piers of from 63.5 to 80 feet. All of these are equipped with draws. On the Altamaha River there are 3, two of which are equipped with draws, with clearances above low water varying from 14 to 29 feet, and between piers from 56 to 86 feet. One bridge crossing at Doctortown is not equipped with draw and has a clearance of 38 feet. The actual available clearance between the piers is 80 feet. Oftentimes when there is a freshet in the river steamboats are delayed on account of this bridge, but it is understood that same is shortly to be replaced with a new type of bridge equipped with draw.

FERRIES.

As stated before, there are only two highway bridges over the navigable portions of the entire system, the crossing of the rivers being carried on to a large extent by means of ferries, of which there are 16 in number. Seven of these are operated by cable suspended over the stream, and so arranged as to be quickly dropped when boats pass. The other 9 are small flats, which are poled back and forth. Four of these ferries are operated by counties and the others by private parties. In all cases a toll is charged for traffic using same.

CANALS.

In 1826 the Brunswick Canal Co. was incorporated by an act of the legislature, and a canal 9 miles in length was constructed between the south branch of the Altamaha River, 6 miles above its entrance into Buttermilk Sound, and Academy Creek at Brunswick. It is understood that $900,000 was expended on same and that two small locks were constructed. This canal was a failure and was never operated to any extent, if at all.

A survey was authorized by Congress and made in 1828, with a view of ascertaining the cost and feasibility of constructing a canal between the Tennessee and Ocmulgee Rivers. Beyond making an estimate of cost, nothing further was done. A report upon this survey is found in House Document No. 482, Fifty-fifth Congress, second session.

APPROPRIATIONS AND PROJECTS TO DATE.

Ocmulgee River.—As early as 1763 the Province of Georgia provided for keeping clear the channels of its rivers and navigable creeks by setting apart certain fines and forfeitures for that purpose.

In December, 1817, Georgia having in view the internal improvement of several copious and extensive rivers in that State, passed an act to appropriate money for the improvement of internal navigation of the State of Georgia, allotting the sum of $10,000 for the improvement of the Ocmulgee River. In 1826 $30,000 was appropriated, of which $10,000 was to be expended above Macon. In 1836 and 1837 $20,000 was appropriated. All of the appropriations of the State were expended under the direction of commissioners.

Digitized by Google

The first notice taken of this river by the Government was in 1852, when an examination and survey were ordered, but no appropriation was made at this time. In 1875 another examination was made, from Macon to The Forks, and from Macon to Covington, 40 miles above.

The first appropriation made by Congress was in 1876, when $15,000 was appropriated for this river and the Altamaha. The original project, based upon the survey of 1875, provided for a channel with 4-foot depth at low water from Macon to Darien, and the amount expended under this project and its modifications was $79,000. The existing project of improvement, based upon a survey made of the river in 1889, was adopted by Congress in 1890, and provided for the establishment of a 3-foot channel at ordinary summer low water from Macon to The Forks. The cost of the improvement as given in the project of 1890 was estimated at $210,000, provided funds were annually and adequately provided, besides $3,000 to $5,000 for annual maintenance.

Oconee River.—The first appropriation for the improvement of this river was made by the State in 1815, and between that year and 1842, $45 000 was appropriated and expended under a commission. The greater portion of this money was expended between Dublin and the Central of Georgia Railroad bridge 28 miles above. Between 1874–1885 $8,575 was raised and expended by the Oconee Steamboat Co. between the same points.

The first appropriation made by the Government was in 1878. Under the original project and its modifications adopted by Congress in 1875 there was expended $45,000. The existing project was adopted by Congress in 1890, and provides for obtaining 3 feet at ordinary summer low water from Milledgeville to the mouth. The estimated cost of this improvement was $171,000, besides from $3,000 to $5,000 for annual maintenance. The river and harbor act of 1905 authorized the expenditure of $3,000, of this amount to clean out the river from the Georgia Railroad bridge, 54 miles above Milledgeville, to the northern boundary of Green County, 17 miles above. A previous provision was made in the river and harbor act of 1886 for expending $1,500 over the same section.

Altamaha River.—The original project of improvement for the Ocmulgee and Altamaha Rivers submitted in 1875 contemplated accomplishing a channel 4 feet deep from Macon to Darien. The first direct appropriation made for the Altamaha River was in 1878 when Congress appropriated $8,000, which was expended on the northern arm of the delta, known as Darien River. An examination was made of this river in 1880 and in 1881 $5,000 was appropriated for the construction of a snag boat. A total of $70,000 was expended upon this river previous to the adoption of the project adopted in 1890. The existing project adopted in 1890 provides for the establishment of a channel 3 feet deep at ordinary summer low water stage from Darien to the conjunction of the Oconee and Ocmulgee Rivers. The total estimated cost of this project was $129 000, provided funds were regularly and adequately supplied; besides from $3,000 to $5,000 for annual maintenance.

SUMMARY.

Approximately $115,000 was appropriated by the State of Georgia and expended upon the Oconee and Ocmulgee Rivers previous to the adoption of any project by the Government. Between 1876 and 1890 the Government appropriated $189,500 for the improvement of the three rivers, which with the exception of $510.50 was expended. Since the adoption of the existing project in 1890, Congress has appropriated $691,843.53, including the unexpended balance of $510.50 remaining from the earlier project. Of this amount there is an available balance at this time of $63,000. The total estimated cost of the improvement expected to be accomplished under the existing project is $510,000 provided funds are regularly and adequately supplied; and between $3,000 and $5,000 was estimated for the annual cost of maintenance for each river. Instead of the funds being provided as expected, there have been 13 allotments since the project was adopted for the Altamaha, 15 for the Oconee, and 13 for the Ocmulgee. Assuming $12,000 for the annual maintenance of the rivers as provided for, there could have been appropriated up to this time, in order to carry out the requirements, $756,000.

SUMMARY OF WORK DONE.

The work done by the Government between 1878 and the present time consisted of the removal of 80,400 snags and 6,200 stumps from the channel. There has also been removed from the banks 267,000 overhanging trees, logs, and

Digitized by Google

saplings, and 4,600 trees were girdled. Thirty thousand cubic yards of stone have been removed from shoals and 20,000 cubic yards of sand, clay, and gravel from cut-offs, false points, and from shoals in the channel. Three thousand two hundred linear feet of training wall and spur dams and 11,000 linear feet of bank revetment have also been constructed.

The expenditure of the funds allotted for the improvement includes the cost of all plant used during the last 30 years. And at the present time there is engaged upon the work a steam hoister equipped with Hayward bucket; steam drill and breaking-out apparatus; 1 snag boat; 2 pile drivers; 1 tender boat, and a number of barges, quarterboats, and other miscellaneous property. And a 10-inch hydraulic pump boat is being constructed.

IMPROVEMENTS ACCOMPLISHED.

Early records concerning the business carried on upon the rivers specifically state that navigation was limited to about eight months in the year. And, as far as can be ascertained, there was not over 1 foot of water on many of the shoals previous to the commencement of the work under the present project.

The depth to be accomplished under the present project is, to obtain 3 feet at an ordinary summer low-water stage. This datum plane is generally 1 foot higher than the low-water datum established by the recent survey. The present controlling depth at low water on the Altamaha River is 3 feet; on the Ocmulgee from The Forks to Hawkinsville it is 2.5 feet by the new datum plane and somewhat over 3 feet by the existing project. Between Hawkinsville and Macon it is 1.5 feet by the new datum and 2.5 by the existing project. On the Oconee River between The Forks and a point 15 miles above Dublin it is 2 feet, referred to the present low-water establishment, and very near 3 feet referred to the existing project. Between a point 15 miles above Dublin and Milledgeville the controlling depth is about 1 foot, referred to the present establishment, and 2 feet referred to the existing project. In general, the controlling depth referred to the established plane of the existing project, with the exception of 50 miles below Milledgeville, has practically been accomplished.

Before any work was done, it was impracticable to raft logs at or near a low-water stage; and it is cited that in 1879, 360 timber rafts were detained on the Ocmulgee River by being unable to float. The removal of rock from the shoals in the vicinity of Hawkinsville and Macon has increased the controlling depth not less than 2 feet at these localities; and the removal of logs, snags, and similar obstructions permits, at this time, the successful rafting of timber from Hawkinsville and Dublin to Darien at an ordinary low-water stage. Freight boats can navigate the river at this time between Hawkinsville and Darien, and between Dublin and Darien for at least 20 per cent more of the time than before the improvement of the rivers commenced under the present project; and navigation has been made possible for about nine months of the year between Hawkinsville and Macon.

A considerable expenditure has been made on that section of the river just below Macon in the construction of regulating and revetment works. The situation there is now under control, and with the removal of the material in the channel with a hydraulic pump boat, it is not thought that there will be any difficulty in obtaining the required depth for practical navigation at this locality.

The work accomplished improved navigation to such an extent that in 1890 it was estimated that the freight rates from the principal points on the river had been reduced 30 per cent, due to the improvements accomplished up to this time. Through water transportation on the rivers has been irregular, due to some extent to the poor navigability of the rivers and to the fact that the railroads have regulated their freight rates from junction points so that the steamboat lines could not compete successfully. Even with this irregular transportation, the rivers have been of great service as regulators of railroad rates from points which are adjacent to the rivers. One instance is cited to show the value of river transportation:

"The Hawkinsville & Deep Water Boat Co. entered the field as a protective organization in 1896, as a result of a raise in rate, arbitrarily basing Hawkinsville from south Ohio River points, on Macon, plus a local. That meant death to the Hawkinsville's jobbing trade and higher prices for heavy groceries from the West. Hawkinsville then went into the boat business. Its citizens built the *City of Hawkinsville* of 310 registered ton capacity, and it made for deep water, going through to Savannah. Result, Hawkinsville has the best rate of freight of any city in the State with less than 30,000 inhabitants."

Digitized by Google

WORK REQUIRED FOR FURTHER IMPROVEMENT.

The shoalest water and the worst obstructions are found in four stretches, the length of each being from 12 to 15 miles. Two of these stretches consist of a series of sand shoals; one just below Macon and the other just below Milledgeville. The other two series are rock shoals found at and in the vicinity of Hawkinsville and Dublin. At the four localities mentioned, the river is confined, except at abnormal freshets, within reasonably high banks. The physical conditions at the four localities are such that it would be possible to make improvement by slack water navigation by means of locks and dams. This method, however, would be very expensive and would be costly to maintain; and the commerce on the rivers at present is not sufficient, nor is the prospective business such as to justify improvement by this method. The slopes are easy and uniform and the discharge of the rivers is sufficient to accomplish a depth warranted by present and prospective business without the necessity of adopting locks and dams.

When the preliminary examination for the Altamaha, Oconee, and Ocmulgee Rivers were ordered, Congress provided for a special examination of the Ocmulgee River with a view of ascertaining the feasibility of improvement on the Ocmulgee between Macon and Hawkinsville by slack-water navigation. The report upon this examination was submitted June 23, 1909, and was adverse to improvement by this method, and the Board of Engineers expressed their opinion that this section of the river was not worthy of improvement by locks and dams. Consequently, no further detail study has been made of this method, either below Macon or at the three other sections where the worst shoals exist.

There are six different classes of work required in order to accomplish the desired improvement:

(*a*) The removal of sand shoals; (*b*) the removal of rock shoals; (*c*) the removal of logs, stumps, snags, and overhanging trees; (*d*) the opening or closing of sucks and cut-offs; (*e*) the revetment of caving or eroding banks; (*f*) the contracting of the rivers at certain points by regulating works.

(*a*) *Sand shoals.*—An attempt has been made at various times to remove sand shoals by means of regulating works. In some instances this has been successful; in others, a failure. Oftentimes the construction of training walls has simply resulted in an increased depth opposite same with the formation of a shoal below. The most practical method of making and maintaining a channel through most of the sand shoals is to combine regulating works with dredging. Careful estimates have been prepared giving the required quantities of material to be removed in order to accomplish a channel with various depths through all the shoals. These estimates, together with length of shoals, are contained in the following tables:

Earth removal.

OCMULGEE RIVER.

Localities.	To obtain—					
	3 feet.		4 feet.		5 feet.	
	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.
	Feet.	*Cubic yards.*	*Feet.*	*Cubic yards.*	*Feet*	*Cubic yards*
Forks to Lumber City, mileage 12	.....	.....	4,199	22,364	15,673	[illegible]
Lumber City to Abbeville, mileage 96	132	660	3,986	20,889	24,941	161,[illegible]
Abbeville to Hawkinsville, mileage 135	.....	.....	924	5,268	13,106	34,[illegible]
Hawkinsville to mileage 189	1,188	6,270	6,785	38,519	46,763	316,[illegible]
Mileage 189 to Macon, mileage 205	14,586	94,837	35,989	273,815	62,446	573,[illegible]
Total	15,906	101,767	51,883	360,855	162,929	1,[illegible]
	[1] 3	.....	[1] 9.8	.....	[1] 31.0	.....

[1] Miles.

Digitized by Google

Earth removal—Continued.

OCONEE RIVER.

Localities.	To obtain—					
	3 feet.		4 feet.		5 feet.	
	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.
	Feet.	*Cubic yards.*	*Feet.*	*Cubic yards.*	*Feet.*	*Cubic yards.*
The Forks to Dublin, mileage 78	2,112	11,292	14,770	90,607	49,165	348,141
Dublin to Central of Georgia R. R. bridge, mileage 107	924	4,766	14,293	82,980	32,078	238,500
Central of Georgia R. R. bridge to Milledgeville, mileage 145	26,954	174,992	45,039	371,411	71,378	703,495
Total	29,990 [1] 5.7	191,050	74,102 [1] 14	544,998	152,621 [1] 29	1,290,136

ALTAMAHA RIVER.

Mouth of river to Doctortown, mileage 59			3,432	10,360	6,151	42,216
Doctortown to The Forks, mileage 137			4,067	22,089	22,521	147,462
Total			7,499 [1] 1.4	32,449	28,672 [1] 5.4	189,678

NOTES.—
For 3-foot project, width allowed 73 feet, depth 4.5 feet.
For 4-foot project, width allowed 75 feet, depth 5.5 feet.
For 5-foot project, width allowed 80 feet, depth 6.5 feet.
No allowance for slopes, as width and excess depth are considered sufficient to care for same and to give a bottom width of 60 feet with project depth.

[1] Miles.

(*b*) *Removal of rock shoals.*—The removal of rock shoals is a comparatively easy matter, and when a channel is obtained through same it is permanent. A successful and economical method of carrying on this work has recently been inaugurated, and at this time the removal of rock shoals is being done at a unit of cost of approximately $1 per cubic yard.

Rock removal.

OCMULGEE RIVER.

Localities.	To obtain—					
	3 feet.		4 feet.		5 feet.	
	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.
	Feet.	*Cubic yards.*	*Feet.*	*Cubic yards.*	*Feet.*	*Cubic yards.*
The Forks to Lumber City, mileage 12			396	1,205	792	3,619
Lumber City to Abbeville, mileage 96	66	205	1,954	6,178	5,383	21,822
Abbeville to Hawkinsville, mileage 135	528	1,408	4,098	14,557	11,404	48,485
Hawkinsville to mileage 189	2,870	9,938	5,439	25,292	14,920	73,585
Mileage 189 to Macon, mileage 205						
Total	3,464 [1] 0.7	11,551	11,887 [1] 2.3	47,232	32,499 [1] 6.1	147,511

[1] Mile.

Digitized by Google

Rock removal—Continued.

OCONEE RIVER.

Location.	To obtain—					
	3 feet.		4 feet		5 feet.	
	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging.	Linear length of shoals.	Dredging
The Forks to mileage 78	1,518	5,140	5,043	18,294	11,667	[illegible]
Dublin to Central of Georgia Ry. bridge, mileage 107	3,300	12,150	11,273	45,929	23,080	[illegible]
Central of Georgia Ry. bridge to Milledgeville, mileage 145	(2)	2,000	(1)	3,000	(1)	[illegible]

ALTAMAHA RIVER.

Mouth of river to Doctortown, mileage 59						
Doctortown to The Forks, mileage 137			500	2,000	800	[illegible]
Total			500 [2] 0.1	2,000	800 [2] 0.15	[illegible]

NOTES.—
Width allowed for each project depth is 60 feet.
Depth allowed is 1 foot in excess of project.

[1] Bowlders. [2] Mile.

(c) *Removal of logs, snags, and similar obstructions.*—The removal of logs, snags, and similar obstructions is readily accomplished with snag boats. This work has been going on practically ever since the improvement of the rivers was first undertaken by the Government, though for long periods on a small scale and without adequate plant. These obstructions did not all exist at the outset, but accumulated in sections of the rivers to such an extent as to render navigation impossible at low stages of the river. At this time the worst obstructions of this type in the three rivers, with the exception of one stretch of 40 miles below Milledgeville, have been removed, and with the construction of one new snag boat the removal of this class of obstructions can be readily accomplished in a couple of years, after which the operation of one snag boat of approved type would keep the rivers clear.

(d) *Opening and closing of sucks.*—An inspection of the rivers shows that some 20 cut-offs, or sucks, should be closed and 4 or 5 opened. In most instances the closing of these sucks can readily be done with the snag boat by obstructing the mouths of same with snags, stumps, and logs that have been removed from the channel. In a few instances closing dams will be required.

(e) *Revetment of caving or eroding banks.*—The character of the banks along the rivers is quite variable. In certain sections the rivers wind through an alluvial valley and the banks are soft and readily eroded; but the river is narrow through these sections, a good general depth exists, and while the alignment of the rivers changes slightly, due to freshets, it will be more economical to keep the channel clear of snags, stumps, and similar obstructions than to undertake the revetment of the banks. At other sections the character of the banks is such that erosion slowly occurs at all times, and opposite these sections there are sand shoals. At these localities the revetment of caving banks would be beneficial and advantageous. At some sections of the rivers there are short detached eroding banks, and the material eroded from same is carried a short distance downstream, often forming sand bars. It is estimated that 32,500 linear feet of revetment work could be advantageously constructed, of which 8,000 linear feet is required on the Ocmulgee, 15,000 on the Oconee, and 9,500 on the Altamaha.

Digitized by Google

It is impossible to say just how far revetment work should be carried, and the estimates given above may be increased or diminished as the work advances and the result of dredging is ascertained.

(*f*) *Regulating works.*—Just below Macon a considerable amount of money has been expended in the construction of training walls for the purpose of canalizing to a certain extent a section of the river about 6 miles in length. The results obtained have not been entirely satisfactory, but the work has resulted in the leveling of the bed of the river through this section. The crests of the shoals have been removed, and the pools have been filled. To raise the training walls would simply mean to raise the bed of the river, and this class of work must be coordinated with dredging operations. A stretch of river below Milledgeville which has not been improved at all will require extensive regulating works. A few wide reaches on the Altamaha necessitate the construction of contracting works. It is estimated that 5,000 linear feet of training wall will be required on the Altamaha, 4,000 on the Ocmulgee, and 7,000 on the Oconee. As in the case of revetment work, it is impossible to say just what quantity of this class of work will be required, as much depends upon the success of removing the shoals by hydraulic dredging. It is thought that the latter method will be much more economical than extensive contracting works, which are expensive to construct and maintain.

ESTIMATES FOR EARTH AND ROCK REMOVAL FOR VARIOUS PROJECTS.

Project A.—To obtain 3 feet at low water (low water for all projects is the established datum plane previously described) for the three rivers, the head of improvement on the Ocmulgee being at the Macon, Dublin & Savannah Railroad bridge at Macon and for the Oconee the highway bridge at Milledgeville.

Project B.—To obtain 4 feet at low water for the three rivers.

Project C.—To obtain 5 feet at low water for the three rivers.

Project D.—To obtain 3 feet at low water for the Altamaha and Ocmulgee Rivers and 4 feet in the Oconee River from The Forks to the Central of Georgia Railway bridge, 38 miles below Milledgeville, and 3 feet from this bridge to Milledgeville.

Summary of estimates for projects A, B, C, and D.

	Earth removal.		Rock removal.	
	Linear length.	Cubic yards.	Linear length.	Cubic yards.
PROJECT A.	*Miles.*		*Miles.*	
Altamaha River				
Ocmulgee River	3.0	101,767	0.7	11,551
Oconee River	5.7	191,048	1.0	19,290
Total	8.7	292,815	1.7	30,841
PROJECT B.				
Altamaha River	1.4	32,449	.1	2,000
Ocmulgee River	9.8	360,855	2.3	47,232
Oconee River	14.0	544,998	3.0	67,223
Total	25.2	938,302	5.4	116,455
PROJECT C.				
Altamaha River	5.4	189,678	.15	5,000
Ocmulgee River	31.0	1,246,553	6.1	147,511
Oconee River	29.0	1,290,136	8.5	213,553
Total	65.4	2,726,367	14.75	366,064
PROJECT D.				
Altamaha River	1.4	32,499	.1	2,000
Ocmulgee River	9.8	360,855	2.3	47,232
Oconee River	10.6	348,579	3.0	67,223
Total	21.8	741,883	5.4	116,455

Digitized by Google

ESTIMATES OF COST FOR VARIOUS PROJECTS.

1. *Removal of material.*

Project A:	
Earth, 293,000 cubic yards, at 15 cents	$43,950
Rock, 31,000 cubic yards, at $1.10	34,100
Total	78,050
Project B:	
Earth, 938,000 cubic yards, at 15 cents	140,700
Rock, 116,000 cubic yards, at $1.10	127,600
Total	268,300
Project C:	
Earth, 2,726,000 cubic yards, at 15 cents	408,900
Rock, 366,000 cubic yards, at $1.10	402,600
Total	811,500
Project D:	
Earth, 742,000 cubic yards, at 15 cents	111,300
Rock, 115,000 cubic yards, at $1.10	126,500
Total	237,800

2. *Training walls and revetment.*

Training walls, 16,000 linear feet, at $3.50 per foot	$56,000
Revetment, 32,500 linear feet, at $2.50 per foot	81,000
Total	137,000

NOTE.—The cost of snagging operations, the closing of cut-offs, and the construction of regulating works and bank revetment will be the same, whether the project A, B, C, or D is considered.

3. *Snagging work.*—For carrying on this work a new snag boat will be required, the cost of which is given in the cost of plant. It is assumed that the new snag boat, with the one now engaged will clear the rivers of general obstructions in two years, at an estimated cost of $30,000.

4. *Opening and closing cut-offs.*—It is assumed that the most of this work can be done with the snag boat, the cost of which is included in the cost of snagging operations. A few cut-off dams will be required, the estimated cost of which is $5,000.

5. *Plant.*—In arriving at the cost of necessary plant, and in addition to that at present in commission, it is assumed that if project A is adopted, the accomplishment of same will take place in three years. If project B or D is adopted, that it will be accomplished in four years; and if project C, five years.

Project A.

1 snag boat, at estimated cost	$25,000
1 pile driver, at estimated cost	2,500
1 tender boat to dredge and other plant	4,000
8 barges	2,800
1 quarterboat	400
Total	34,700

Project B.

1 snag boat, at estimated cost	$25,000
2 steam hoisters, equipped with Hayward bucket, steam drill, and rock breaker	30,000
1 hydraulic dredge, with pontoons and outfittings	23,000
2 tenders for plant, at $4,000 each	8,000
10 barges, at $350 each	3,500
1 pile driver	2,500
Total	92,000

Digitized by Google

Project C.

1 snag boat	$25,000
5 steam hoisters, equipped with Hayward bucket, steam drill, and rock breaker	75,000
2 hydraulic dredges, at $23,000 each	46,000
3 tenders for plant, at $4,000 each	12,000
10 barges, at $350 each	3,500
2 pile drivers, at $2,500 each	5,000
Total	166,500

Project D.

Same as project B.

SUMMARY OF ESTIMATES OF COST.

Project A.

Removal of material	$78,050
Training walls and revetment	137,000
Snagging	40,000
Opening and closing sucks	5,000
Cost of plant	34,700
	294,750
10 per cent for contingencies	29,475
Total	324,225

Project B.

Removal of material	$268,000
Training wall and revetment	137,000
Snagging	30,000
Closing and opening sucks	5,000
Plant	92,000
	532,000
10 per cent for contingencies	53,200
Total	585,200

Project C.

Removal of material	$811,500
Training wall and revetment	137,000
Snagging	30,000
Closing and opening sucks	5,000
Plant	166,500
	1,150,000
10 per cent for contingencies	115,000
Total	1,265,000

Project D.

Removal of material	$287,800
Training walls and revetment	130,000
Snagging	30,000
Closing and opening sucks	5,000
Plant	92,000
	494,800
10 per cent for contingencies	49,480
Total	544,280

Digitized by Google

MAINTENANCE.

The general character of the rivers covering a length of 494 miles of navigable waterways, with the existing physical conditions, renders it impossible to estimate with any degree of accuracy what will be the annual cost of maintenance after improvement is accomplished according to either of the projects considered. Where a channel is cut through a rock shoal the same is permanent and no maintenance will be required. Where logs, snags, and similar obstructions are removed from the channel and overhanging trees cut from the banks there will be very little difficulty in keeping the rivers clear of this class of obstructions. And an estimate for this class of maintenance work can be made with approximate precision. Systematic revetting of banks as recommended will, to a large extent, help to maintain the alignment of the river and prevent the formation of shoals. The construction of regulating works will improve conditions at certain localities, but the maintenance of such must be provided for.

The accomplishment of a channel through sand shoals can be accomplished by dredging, and although regulating works will assist in the maintenance of the channel, frequent dredging will have to be resorted to in order to maintain the project depth at certain localities.

After the adopted project is completed one snagboat operated throughout the year will keep the channel clear of logs, snags, and similar obstructions; the operating cost of which will be $12,000 annually. One pumpboat working throughout the year will probably maintain the project depth through sand shoals; the operating cost of which, with tender, will be $18,000 anually. The estimated cost of maintaining training walls and bank revetment is placed at $5,000, making a total estimate for maintenance $35,000 annually. The success of the improvement depends, to a large extent, whether appropriations are made as recommended.

WATER POWER.

With the exception of a few notable cases the largest water powers of Georgia are found just below the southern fall line, where the rivers pass from the hard crystalline area to the softer formation of the Coastal Plain. Above the fall line on the Ocmulgee and Oconee the development and utilization of water power for industrial and commercial purposes overlap any consideration of this portion of the waterway for navigation, unless it be for short detached sections which at this time do not appear to warrant any consideration for improvement.

The Altamaha River system affords with its falls and discharge a minimum annual horsepower of about 47,000, and the minimum during the six high-water months is approximately 78,000. The utilization of various falls for water power can not be successfully coordinated with the improvement for navigation over the sections where the falls exist, but the construction of certain dams above the fall line create extensive reservoirs; and if the flow from same during low-water periods is properly regulated the discharge during these periods will materially aid navigation below Macon and Milledgeville. A large dam has been constructed above Macon by the Central of Georgia Power Co. This is the largest power plant in the south and cost in the vicinity of $3,000,000. This dam is 100 feet high and 1,400 feet long. The reservoir extends 18 miles back and its capacity is 2,367.3 million cubic feet. This power plant is capable of generating 22,000 horsepower. And, during extreme low-water periods, the required discharge for development of power for commercial use under contract will be much greater than would have been the ordinary discharge if the dam did not exist. The capacity of the reservoir is sufficient to give an increased discharge over what it would have been without same during low-water periods of from 45 to 60 days' duration. It is also expected that the construction of this dam will have a marked effect upon freshet conditions. In that, oftentimes a portion if not the entire heavy rainfall will be required in filling the reservoir. Or, if it is not full, there will not be that sudden downrush of water that has previously occurred. This plant is just completed and there has been no opportunity of observing conditions during freshets.

On the Oconee River there is a large hydro-electric power development below Athens, Ga., where an effective fall of 51 feet will be taken advantage of. The

Digitized by Google

reservoir of this plant contains about 70,000,000 cubic feet. This plant is nearly completed and is expected to have a beneficial effect upon the discharge below Milledgeville during low water. Besides the above power plants there are 15 other similar power developments on the Ocmulgee River and its tributaries and four or five small power plants on the Oconee and its tributaries.

Below the fall line there is practically no opening for development of power, except on one or two of the tributaries where a few feet fall could be obtained by the construction of dams.

DRAINAGE OF SWAMP AND OVERFLOWED LANDS.

The valley of the Altamaha River system below the fall line is very fertile. The acreage of same, excluding that on the tributaries, is 300,000 acres, and, if the river banks could be diked and the valley drained, it would become exceedingly productive. Reclamation, however, can not be coordinated with the improvement of the rivers for navigation. For, if the rivers were diked, the channels would be gorged during freshets and there would be danger of serious inundation, and a great movement of material would take place along the beds of the rivers, and shoals might be expected to form. A special study was made of one section bordering the lower portion of the Altamaha River.

Beginning at a point 77 miles above the mouth of the Altamaha there is a large section of country on the east side of the river that is known as the "flat clay lands." The land is very fertile, and during freshets some 200,000 acres are overflowed. The river swamp bordering the river for 50 miles is between 1 and 2 miles deep. Back of this there is an irregular line of sand hills. During freshets the river backs through the sand ridges back of the river swamp and also comes in by Beards Creek, located at the upper end of this territory. It would not be an extensive undertaking to construct dikes and so stop the overflow through the breaks in the sand ridges. However, by doing so it could not be considered that an improvement to navigation would ensue, neither is it thought that any direct harm would follow the construction of these levees, as the river swamp bordering the river on the other side is of sufficient width to take care of the flow during high water.

As no improvement to the navigability of the river would ensue by the stoppage of this overflow, this work can not be coordinated with the improvement of the rivers, and no estimate of cost for the protection of the flooded area has been prepared.

LANDINGS, TERMINALS, AND TRANSFER FACILITIES.

No harbor exists at the mouth of the Altamaha River, but Darien is reached by the North Fork. No regular line of boats plies between this port and coastwise or foreign ports, and in the past there has been no transshipment of freight, other than lumber or timber, nor is it likely that such will occur in the future. All timber that is rafted down the river is either shipped on vessels from Darien or else towed in rafts to Sapelo, where it is loaded on steamers and vessels for export trade, such vessels passing to sea over Sapelo Bar. Brunswick can be reached by a protected waterway from the mouth of the South Altamaha River, and the distance between these two points is 20 miles. At this port there is a regular line of coastwise steamers where the transshipment of freight can be made to northern ports.

At Brunswick there is some 3 miles of wharves, owned in part by individuals, in part by corporations, and in part by railroads. Extensive additions have recently been constructed by the Atlanta, Birmingham & Atlantic Railroad Co., where the transshipment of freight can economically be made between rail and water. While there are no extensive wharves owned by the public, there are terminal facilities held by individuals or corporations which are extended to all on equal terms, and there is available space suitable for the construction of wharves which can be purchased. The transfer of freight at this port is done by portable hoisting engines.

At several places where railroads cross the rivers traffic agreements have been made between railroads and boat transportation companies. This, I understand, occurs at Doctortown, on the Altamaha; Dublin, on the Oconee; and Lumber City, Abbeville, and Hawkinsville, on the Ocmulgee. The construction of a new railroad crossing the Altamaha near The Forks is expected to give another railroad transfer point. As far as can be ascertained, the railroads at

Digitized by Google

these junction points make traffic agreements on equal terms to all. At Doctortown, Dublin, Lumber City, and Abbeville the transfer of freight from the boats to the landings is done by means of elevators or inclined railways, and at these points and at Macon suitable warehouses have been constructed for storing freight. At these places, as well as at Milledgeville, there is either available public space or space which can be purchased, upon which wharves or warehouses can be constructed, and terminal facilities at these points are extended to all on equal terms.

The valley of this river system, except in two sections, is not very wide. For about 30 miles between Macon and Hawkinsville the average width is from 2 to 3 miles. Elsewhere, on the Ocmulgee, it varies from 2,000 feet to 8,000 feet, the mean width being 6,500 feet. On the Oconee there is one stretch of 25 miles between Milledgeville and Dublin where the width is from 5 to 7 miles. Elsewhere on this river the width of the valley is between 2,000 and 10,000 feet, the mean width being about 6,000 feet. The channel meanders through this valley first touching the highlands bordering the valley and then crossing over to the other side.

On the three rivers there are some 150 landings pretty evenly distributed which can readily be reached from the highlands. At most of the river landings the banks are abrupt and freight boats can lie alongside and conveniently load and unload their freight. Sheds have been constructed at some of the principal river landings for temporarily storing the freight delivered at or taken from these places. The handling of freight on the rivers is, to a large extent, done in a crude and unsatisfactory manner. The prospective business, provided the improvement of the rivers is carried out so as to give a depth that will afford regular and continuous transportation of freight, will result in the transportation companies, or those interested, providing better storage facilities at the various landings and the adoption of approved mechanical appliances for handling freight at the principal transfer points.

MAPS.

There is transmitted with this report a map[1] of the three rivers platted to a scale of 1:10,000, of which 14 sheets are of the Altamaha, 12 sheets of the Oconee, and 13 sheets of the Ocmulgee. On local sheet No. 1 of the Altamaha is shown an index map platted to a scale of 1 inch to 13 miles.

PHOTOGRAPHS.

Photographs are submitted as Appendix A, which are intended to show the general type of regulating and revetment work now being constructed, the character of sloughing banks, moderately caving banks, and those which are fairly permanent. Views are also given showing characteristic landings on the rivers and at the principal transfer points, together with the character of river boats now in operation. A few views showing characteristic reaches near the heads of navigation and wider reaches at the lower portion of the system. A few other miscellaneous views are transmitted, which are considered of interest in connection with the report.

REFERENCES.

The various projects of improvement and reports upon surveys will be found in the following documents:

Oconee River.—Original project, Annual Report of the Chief of Engineers for 1875, part 2, page 41.

Present project, Annual Report of the Chief of Engineers for 1890, part 2, page 432; and House Document No. 211, Fifty-first Congress, first session.

A detail history of the work of improvement up to 1900 is found in the Annual Report of the Chief of Engineers for 1889, part 2, page 1253; and for 1900, part 2, page 1942.

A map of the river made from the survey of 1889 is found in House Document No. 211, Fifty-first Congress, first session.

A report upon the preliminary examination of the river between Dublin and Skull Shoals is found in House Document No. 304, Fifty-eighth Congress, second

[1] Only index map printed.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

session; and also on pages 677 and 1679 of the Annual Report of Chief of Engineers for 1904.

A report upon the survey of this section following the preliminary examination is found in House Document No. 253, Fifty-ninth Congress, second session.

A report upon a special survey of the river, from Milledgeville to Oconee station, at the crossing of the Central of Georgia Railroad, as ordered by Congress on March 3, 1905, is found in House Document No. 264, Fifty-ninth Congress, second session.

The work done since 1900 is tabulated in the various Annual Reports of the Chief of Engineers since then.

Ocmulgee River.—Original project, Annual Report of the Chief of Engineers for 1875, part 2, page 670.

A modification of the orignal project is found in the Annual Report of the Chief of Engineers for 1882, part 2, page 1160; and for 1887, part 2, page 1276.

The report upon the present project is found in the Annual Report of the Chief of Engineers for 1890, part 2, page 1458; and House Document No. 215, Fifty-first Congress, first session.

A detail history of the work carried on up to 1900 is found in the Annual Report of the Chief of Engineers for 1889 and for 1900, part 2, page 1944.

Maps of the river will be found in House Document No. 215, Fifty-first Congress, first session; and in the Annual Report of the Chief of Engineers for 1902, part 2, page 1192.

A special report upon the construction of locks and dams between Macon and Hawkinsville, made in compliance with the River and Harbor act of March 3, 1909, is found in House Document No. 358, Sixty-first Congress, second session.

A report of a special examination from the city bridge at Macon to Juliette, Ga., made in compliance with the River and Harbor act of March 3, 1905, is found in House Document No. 64, Fifty-ninth Congress, first session.

A report upon the examination of the Ohoopee River, a tributary of the Ocmulgee River, made in compliance with the River and Harbor act of March 3, 1909, is found in House Document No. 682, Sixty-first Congress, second session.

Reports of improvement made since 1900 are found in the Annual Reports of the Chief of Engineers since then.

Altamaha River.—Original project, Annual Report of the Chief of Engineers for 1875, part 2, page 670. A modification of the original project is found in the Annual Report of the Chief of Engineers, part 2, page 1107; and for 1887, part 2, page 1176.

A report of the present project is found in the Annual Report of the Chief of Engineers for 1890, part 2, page 1372; and House Document No. 283, Fifty-first Congress, second session.

A detail history of the work of improvement may be found in the Annual Reports of the Chief of Engineers for 1888, part 2, page 1038; for 1889, part 2, page 1246; for 1892, part 2, page 1261; for 1900, part 3, page 1939; and for the work since then, in the Annual Reports of the Chief of Engineers to date.

Maps may be found in the Annual Report of the Chief of Engineers for 1884, part 2, page 1116; and in House Document No. 283, Fifty-first Congress, second session.

Special Reports.—Besides the above, an examination was made and a line of levels run between Macon on the Ocmulgee to the junction of the Yellow and Ocmulgee in 1903, by the Geological Survey. A line of levels was run between the junction of the Ocmulgee and Yellow Rivers and a point 57 miles above on the Yellow River in 1903, by the Geological Survey. Also, a similar examination was made and a line of levels run on the Yellow from its junction with the Ocmulgee to Constitution, near the head of the river, 52 miles from the Ocmulgee, in 1903 by the Geological Survey.

Profiles of these streams together with elevations are to be found in Water Supply Paper, United States Geological Survey, No. 115, published in 1905; also in Water Supply Paper No. 197, published in 1907.

A survey of the Oconee River from Milledgeville to the mouth of the Apalachee River was made in 1885 by C. A. Locke, assistant engineer, United States Engineer Department, and is found in the Annual Report of the Chief of Engineers for 1885, page 1329 et seq.

A survey of the Oconee River above the mouth of Middle Oconee was made in 1902 by the Geological Survey, and the elevations of same are found in Water Supply Paper No. 197, published in 1907.

Digitized by Google

COMMERCE.

History of navigation on these rivers extends practically through the nineteenth century. Milledgeville was one of the earliest settlements in the interior of the State. The country in the vicinity of this city and Macon was under cultivation to a considerable extent early in the nineteenth century. Not until many years afterwards was any cultivation carried on along the banks of the lower rivers, and the territory bordering same was covered with dense virgin forest.

The first freight transported on the rivers was that carried downstream on poleboats to the mouth of the Altamaha, where the most of it, consisting of cotton, was taken to Savannah. These poleboats, or flats, were abandoned at the end of the journey. The first steamboat that reached Macon was in 1829. In 1834, 4 steamboats, besides 40 or 50 poleboats, operated between Macon and the coast. The cotton receipts at Macon in 1834 are given at 69,000 bags. In 1855 the Central of Georgia Railroad was completed from the coast to Macon, and the construction of this line drove off the boats by adopting sliding schedules of high rates when navigation was impeded by low water and low rates when navigation was good. The draft of the early boats appears to have been about 2 feet. At this period it appears that freight was collected at Macon from all over the central part of the State, as the earliest record of navigation carried on upon the Oconee River was in 1845.

After the construction of the Central of Georgia Railroad there was a long period when navigation between Macon and Hawkinsville was entirely suspended, and a highway bridge was constructed at Hawkinsville without a draw, which as an obstruction to navigation, and a draw was not installed in same until about 1890.

As the denudation of the forest was carried on farther down the rivers, cultivation commenced to some extent next to the rivers, and through navigation to the coast was reopened. Quite an extensive interchange of freight took place with the Central of Georgia Railroad where it crossed the Oconee River. Later on the construction of the Wrightsville & Tennille Railroad and the Central of Georgia Railroad to Dublin gave a direct connection with the coast from Dublin, and the local business carried up the river to the crossing of the Central of Georgia, 30 miles above Dublin, ceased. The Savannah, Americus & Montgomery Railroad reached Abbeville in 1889, which road passed through a productive section of country, and a line of boats was put on from Abbeville to the coast to offer an outlet to the business done by this road. For four years four or five steamers were employed in carrying the freight delivered by this railroad to the coast. At this time turpentine farms sprang up all along the river valley, and large quantities of rosin and turpentine were produced and shipped by boats down the rivers. When the Savannah, Americus & Montgomery Railroad was extended to Savannah, through boat traffic from Abbeville to the coast was practically suspended. The Atlantic Coast Line Railroad crossing the Altamaha River at Doctortown furnished another transfer point for freight, and, as the junction points became more frequent, local shipments of freight to the junction points increased. Between 1888 and 1891 some 13 steamboats, with tonnage ranging from 100 to 200 tons burden and with a draft when loaded of from 3 to 4½ feet, navigated portions of the rivers. Between 1892 and 1895 from 8 to 10 boats operated. Since then the number has ranged from 5 to 11, the business being spasmodic, as the railroads at times would cut rates when necessary to drive off the water competition. The last attempt to carry on through navigation from Macon was in 1908, when two steamers were constructed at Macon and made regular trips for one year. During that year the boats were prevented, on account of their draft, from running during four months on account of low water. During the eight months that they operated, 3,800 tons of freight was carried, valued at $600,000, and the actual saving in freight rates to the consignees was 12½ per cent. These boats were not suitable for traffic over the upper sections of the Ocmulgee River on account of their model and draft, and their operation was at times carried on with difficulty.

Estimates of the tonnage and value of freight handled on the rivers during the past 10 or 12 years have been prepared for the annual reports to the Chief of Engineers. But much of this data was merely guesswork, and no reliable statistics are available. It would appear from a study of all available data that the mean approximate tonnage for the 12 years previous to 1910

Digitized by Google

for the three rivers was 40,000 tons, valued at $1,800,000. Accurate data have been obtained giving the amount and value of freight carried on the rivers during the year 1910, and this is embodied in the following table:

Commercial data for the year 1910.

Classification.	Volume of freight carried.			Total for three rivers.	Total value of freight.
	Ocmulgee.	Oconee.	Altamaha.		
	Tons.	*Tons.*	*Tons.*	*Tons.*	
Lumber	400	.....	.....	400	$6,000
Fertilizer	5,000	2,800	2,810	10,610	265,250
Cotton	538	200	662	1,400	476,000
Turpentine	328	20	636	984	137,760
Rosin	1,239	150	3,311	4,700	282,000
Cotton seed	1,278	256	1,149	2,683	80,490
Merchandise and miscellaneous	1,625	425	1,030	3,080	492,800
Hay and feed	325	252	200	777	15,540
Brick	150	164	.....	314	3,140
Hardwood	1,640	6,400	.....	8,040	96,480
Crossties	.....	.....	1,400	1,400	9,800
Total	12,523	10,667	11,198	34,388	1,865,260

Ocmulgee River, 12,523 tons, valued at	$760,200
Oconee River, 10,667 tons, valued at	308,960
Altamaha River, 11,198 tons, valued at	796,100
Total	1,865,260
Value of timber and lumber rafted	799,000
Total value of commerce	2,664,260

	Miles.
Average haul on Ocmulgee River	40
Average haul on Oconee River	24
Average haul on Altamaha River	50
Number of boats operated on Ocmulgee	3
Number of boats operated on Oconee	3
Number of boats operated on Altamaha	3

Lumber rafted.

Name of river.	Feet B. M.	Tons.	Value.
Ocmulgee River	13,500,000	16,875	$165,100
Oconee River	13,260,000	16,575	224,100
Altamaha River [1]	29,490,000	36,863	409,800
Total	56,250,000	70,313	799,000

[1] Amount given originated on the Altamaha River. That rafted from the Ocmulgee and Oconee Rivers, with the exception of 8,500,000 feet, passed over the Altamaha to Darien for export. Average distance rafted, 150 miles.

Besides the transportation of miscellaneous freight by river steamboats, large quantities of timber have been rafted down from the lands bordering the river system to Darien. For many years before the war some 25,000,000 feet was cut annually. Since 1871 good records have been kept of the amount rafted to Darien from the rivers, and the total up to the present time amounts to 2,325,000,000 feet, board measure, the annual mean amount being 60,000,000 feet.

During the year 1910, three steamers navigated the Altamaha, four the Oconee, and three the Ocmulgee; although two of these boats only operated for a portion of the year. With the exception of a few trips from the Altamaha to Brunswick, all business done was local, and the average haul was about 40 miles.

Digitized by Google

PAST AND PRESENT LOCAL BUSINESS.

The local business carried on over the rivers last year equals, in all probability, in value that carried on at any time during the past history of navigation, when the greater percentage of same was through transportation to the coast. This amount, perhaps, was exceeded for a few years when there was a transshipment of freight from the terminals of the Savannah & Americus Railroad at Abbeville.

Because no through freight was carried over the rivers during the past year is no criterion in assuming that there would be none carried provided the rivers were put into a better navigable condition. The through freight would naturally be expected to come principally from Macon and Dublin, and Hawkinsville and Milledgeville to a lesser extent. At this time the navigable condition of the rivers is such that it is impracticable to operate through boats of sufficient size from Macon in order to give a reasonable return to the transportation companies.

PROSPECTIVE LOCAL BUSINESS.

The prospective business is of three classes. First, the purely local traffic from Macon, Milledgeville, Dublin, Hawkinsville, Lumber City, and Doctortown to the landings within reasonable distances of these points. Second, through transportation to the coast. Third, the transportation by boats and barges of cargoes of hardwoods to factories where same is used in the manufacture of pulp, staves, boxes, barrels, and other products of this class.

That portion of Georgia on the Coastal Plain is developing more rapidly as an agricultural region than any other portion of the State. The fertility of the lands bordering the Altamaha River and its tributaries was recognized when Georgia was first settled. As far back as 1773, Sir James Wright, governor of the Province of Georgia, reported to the authorities in England, "That the soil bordering the rivers and in the swamps was strong, rich, and fertile, and, in general, consisted of a black loam on top with clay underneath. But, that these lands were intermingled with pine barrens." Strips of land extending 15 miles back from the seacoast are sandy, but above these stretches for some 60 miles the land is rolling and is locally known as the "Altamaha grit region," so called from the kind of rock which crops out on the hillsides in the pine woods. The soil in this region is gray sand with more or less clay. The area of this fertile section covers some 11,000 square miles, and the Altamaha River passes directly through this formation. During the past 25 years this section has increased in population equal to any other equal area is the eastern United States, unless it be a portion of Florida. Above the "Altamaha grit region" the land is generally formed of red clay and gray sand, especially adapted to the production of cotton.

While the pine forest is still a source of some wealth, yet after once yielding a full crop of turpentine and timber, the land on which same exists is more valuable for cotton, corn, and other products than is the forest. That this section is rapidly developing is shown by the increase in population of some of the counties bordering the rivers lying in the Coastal Plain. Take, for instance, Laurens County, in which the city of Dublin is located, whose population during the last 20 years has increased 148 per cent.

Twenty-four counties border the Altamaha, Oconee, and Ocmulgee Rivers at and below the fall line. The total area of same is 10,973 square miles. The total population of these counties in 1900 was 349,366, in 1910 it was 415,483, or a gain of 20 per cent in 10 years, whereas the gain for the whole State of Georgia during this period was 18 per cent. Below are given a few statistics showing the valuation of lands and productiveness of the counties referred:

The valuation of the best lands ranges from $100 to $150 per acre; the valuation of ordinary lands under cultivation, $25 to $75 per acre.

Assessed value of real estate, 1909	$55,000,000
Assessed value of live stock, 1909	$6,100,000
Assessed value of animals slaughtered, 1899	$1,030,000
Amount of hay and forage crops, tons, 1899	8,000
Acreage of land cultivated in cotton, 1910	770,000
Cotton raised, bales, 1910	255,000
Value of cotton raised, 1910	$19,000,000
Acreage of land cultivated in corn, oats, and other cereals, 1910	800,000
Amount of corn, oats, and other cereals raised, 1910, bushels	12,000,000

Digitized by Google

Amount of rosin collected (approximately), 1910, barrels	150,000
Amount of turpentine produced (approximately), 1910, casks	75,000
Amount of sugar cane raised, 1899, tons	12,000
Amount of sirup produced, 1899, gallons	950,000
Amount of sweet potatoes raised, 1899, bushels	1,800,000

In order to ascertain what might be the expected increase in local shipments, provided an improvement to navigation was made so that the boats could make regular schedules, a large number of letters of inquiry were sent to local shippers of freight asking two questions: First, the amount, character, and value of freight that they now deliver to the river boats; second, what increase, if any, would result in their deliveries and receipts to and from the boat companies if regular transportation could be depended upon throughout the year. Some 90 replies were received from these local shippers, and a great deal of interest was manifested by most of the parties. Quotations from a few of these letters are given in Appendix B. The amount and value of freight furnished by them is not mentioned, the same being totaled in the local commerce for the year 1910 before referred to. The information furnished by the local shippers, coupled with the fact that agricultural interests are rapidly increasing and hardwood manufactories are springing up, indicate that the local transportation business will rapidly increase, and, no doubt, will be greatly stimulated by a reasonable improvement in the navigable condition of the rivers.

PROSPECTIVE THROUGH TRAFFIC.

In order to obtain tangible data bearing upon this question, arrangements were made with trade bodies at Macon, Dublin, and Milledgeville for public hearings; and at these hearings, which were well attended by business men and others, I explained the physical conditions of the rivers, mentioned what the Government had done in the past, and stated that a reasonable betterment in the navigable condition of the waterway system could be readily obtained, but that before any new project could be expected to be adopted it would be necessary to show that present and prospective business warranted sufficient appropriations to accomplish same. The response to my request for data bearing upon prospective business shows that the business interests of the cities bordering the rivers are alive as to this matter and have shown much interest in the further improvement of the rivers. Data from trade bodies, transportation companies, and individuals are found in Appendix C.

Two boats were operated between Macon and Brunswick in 1898, and carried between these cities 3,800 tons of through freight valued at $600,000. The cost per ton-mile for the transportation of this freight for the run of 515 miles was 0.014 cents and the average freight rate charged on all traffic was 15.75 cents per hundred pounds, which was 12.5 per cent less than the rail rate between the two points, resulting in a considerable saving to the consignees.

The type of boats put on this run was unsuitable for navigating the river above Hawkinsville in its present navigable condition, and the lack of proper facilities for handling of freight and with more or less expense incurred in the promotion and establishment of the industry, together with the inexperience of those managing same, made the cost per ton-mile greater than it should have been.

Recently the Macon & Brunswick Transportation Co. has raised $65,000 with a view of putting four boats into operation, two of which will be of suitable size for the run between Hawkinsville and Macon, transferring the freight at Hawkinsville to the larger boats, which will run to Brunswick.

Macon's importance as a shipping point is shown in the report furnished by the chamber of commerce of that city. This city has a population of 40.665, an increase of 75 per cent since 1900. The total tax assessments are over $24,000,000, and the bank clearings for 1910 were $66,000,000. The receipts of cotton at Macon during 1910 were 87.225 bales, of which 49,730 were shipped by rail and 37,000 bales manufactured into goods.

Of the quantity shipped from this city, 90 per cent went to the coast, and it is estimated that not less than 30 per cent of this amount would have been transported by water to Brunswick if the rivers had been in a better navigable condition.

The tonnage handled by the railroads in and out of Macon during 1910 amounted to 2,000,000 tons, of which 50 per cent was handled to and from the coast, and it is estimated that one-third of this could have been advantageously transported by river boats if navigation permitted same.

Digitized by Google

The rates fixed by the Macon & Brunswick Navigation Co. average about 15 per cent less than the railroad rates, and a reasonable improvement in navigation would, without doubt, permit of successful and profitable operation of boats and result in a marked saving to the consignees of freight. For cotton alone there would be a direct saving of 20 cents per bale if same could be shipped by river.

Other reports from Dublin, Milledgeville, and Hawkinsville are along the same line, showing conclusively that a large amount of freight would be given to river transportation companies if regular transportation could be developed

TRANSPORTATION OF TIMBER.

The cutting of pine timber from the lands bordering the Altamaha River system still goes on, and while only 45,000,000 feet b. m. was rafted down the river last year, this great decrease from previous years does not wholly indicate the lack of supply, but is due principally to the unfavorable market conditions that existed during the past year. It is admitted, however, that the transportation of pine timber by rafting will rapidly decrease, but the transportation of the hardwoods bordering the rivers is only beginning to take place and is bound to rapidly increase.

The valleys of the rivers below the Fall Line are generally covered with various kinds of hardwoods and swamp pine. The varieties of woods found are: Cypress, oak, gum, swamp pine, hickory, maple, ash, beech, poplar, cottonwood, magnolia, sycamore, and a small quantity of black walnut. The area of the swamp lands upon which there is a growth of hardwoods is for the Ocmulgee River, 99,000 acres; for the Oconee, 98,000; and for the Altamaha, 75,000. The average cut of hardwood timber from these lands is estimated at 5,000 feet b. m. per acre. But by taking inferior grades, which later on will be merchantable, the average cut will be not less than 7,000 feet per acre, which means a total of 2,000,000,000 feet b. m. One of the most reliable lumber estimators of this section has personally inspected the lands bordering the rivers and estimates that there is 1,000,000,000 feet of hard wood timber in the valley of the Ocmulgee River alone. This timber can not be rafted and must be transported on barges or boats. And it is only a question of a few years before this class of transportation will be extensive There are at this time hardwood factories receiving the material coming from the valleys of the Altamaha River system. Four exist at or near Milledgeville, one at Hawkinsville; two at Dublin; one large factory at Darien; and one very large box factory at Brunswick which has just commenced operation. Communications from manufactures of hardwoods which refer to the necessity for improvement to navigation so as to transport the timber to their mills are found in Appendix D.[1]

RÉSUMÉ AND RECOMMENDATIONS.

While a considerable amount has been expended for the improvement of the Altamaha River system, the method of appropriating funds has been so irregular that work could not be carried on in a systematic and comprehensive manner. The amount expended for the improvement and maintenance of 487 miles, the navigable portion of the rivers, for the past 20 years has averaged only $30,000 annually, which has resulted in a decided improvement in the navigable condition of same.

The physical characteristics of this river system are favorable for and permit of further improvement at a moderate cost. In the past and at the present time, difficulties experienced in navigation coupled with diversity in boat types, in motive power, in terminal facilities and general traffic contracts have resulted in a lack of organization of the transportation companies as a whole, and heretofore the companies operating have experienced difficulties in competing with the railroads for through freight traffic. Even with the rivers in their present condition, it has been demonstrated that through traffic can be carried on, although with the present difficulties the same is not practicable from an economical standpoint. Local traffic between the principal cities and transfer points to the territory adjacent to same has been and is now being carried on with success.

There are fewer difficulties attending the improvement of the Altamaha River system than with many other rivers now undergoing improvement. It

[1] Not printed.

Digitized by Google

has been shown that the discharge of the Oconee and the Ocmulgee Rivers at the Fall Line is sufficient to give a moderate increase in the navigable depth at a low-water stage. Further, the rivers are not unduly crooked, except for two stretches of about 25 miles each near the head of navigation on each river; the slopes are easy and uniform and the current slow. No artificial obstructions exist to interfere with further improvement and same can be accomplished by removing the natural obstructions consisting of sand and rock shoals, logs, snags, and similar obstructions, and the construction of a moderate amount of revetment and regulating work.

The estimated cost of obtaining 3 feet at low water is $324,225; 4 feet, $585,200; 5 feet, $1,265,000.

A 3-foot depth during low-water stages is hardly sufficient to permit of the operation of freight boats of a type that would carry sufficient cargo for long hauls, which would return a profit to the transportation companies. An improvement to the extent of obtaining 4 feet at low water would facilitate navigation so that cargoes of not less than 200 tons could be carried for at least 85 per cent of the year. And with the rivers in normal condition, this tonnage could be increased to 300 tons or more. A 5-foot depth would, of course, increase the tonnage capacity of the boats, but in order to create this extra foot, there would have to be expended more than twice the amount required to obtain 4 feet. And, at this time, the prospective business does not appear to warrant an expenditure that would be required to accomplish this depth.

The most difficult section of river to improve and maintain is a stretch of 38 miles below Milledgeville. Three feet can be obtained through this section at a reasonable cost. To obtain 4 feet will require an additional expenditure of $40,920. Those interested in the improvement at Milledgeville have expressed an opinion that a channel with 3 feet at low water would answer present and prospective requirements.

Considering the present and prospective business on the rivers and the cost of obtaining improvements for various depths, it is recommended that project D, heretofore considered, be adopted, which provides for obtaining 4 feet at low water for the Altamaha, the Ocmulgee to the Macon, Dublin & Southern Railroad bridge at Macon, the Oconee from The Forks to the Central of Georgia Railroad bridge, 38 miles below Milledgeville, and 3 feet from this bridge to the highway bridge at Milledgeville. The estimated cost of this improvement is $500,000, exclusive of available funds on hand which are being expended in such a manner that the improvement resulting from the work now being carried on aids in accomplishing a 4-foot project. The accomplishment of this project will result in the transportation of through freight from Macon, Dublin, and other points to and from the coast.

Considering the prospective business for Macon alone, it is estimated that 300,000 tons of freight could be advantageously and economically handled by water transportation annually, provided the rivers were so improved as to permit of practical navigation. Assuming the saving to consignees of freight by river boats to be 10 per cent, there would result an annual saving of approximately $100,000. As stated before, the transportation of freight from Macon is not entirely an experiment, for this has been carried on to a limited extent, under great difficulties, with only a small loss to the transportation companies, which will be turned into a profit, provided improvement is made as recommended.

Dublin, next to Macon, would furnish a considerable quantity of through freight, and, beyond doubt, a large number of landings would furnish their proportion of commodities for the coast in the way of cotton and other farm products.

In my opinion, the annual saving to the consignees on through freight alone would far exceed the annual cost of maintenance together with the interest on the cost of obtaining a 4-foot project, and local freight would be greatly stimulated by the improvement and would result in a saving to a large number of small shippers.

While it is impossible to estimate accurately the annual cost of maintenance, provided a 4-foot project is adopted, it is believed that the cost of this will not exceed $35,000 annually. And it is recommended that a provision be made for an annual allotment of this amount for the maintenance and preservation of the improvement after its completion. It is further recommended, if project D is adopted, that the work be carried on in a systematic and comprehensive manner, with a view of completing same in four years. And that, in order to do this, it is recommended that appropriations be made annually;

Digitized by Google

the first one to be $150,000, the second and third $125,000 each, and the fourth $100,000.

It is believed that the work as a whole can be carried on most advantageously and economically with Government plant and hired labor, and this method of executing same is recommended.

Very respectfully, your obedient servant,

E. R. CONANT,
Assistant Engineer.

Col. DAN C. KINGMAN,
Corps of Engineers.

APPENDIX B.

Quotations from letters received from local shippers of freight on the rivers.

I am a Scotchman, and knowing what the deepening of the Clyde has done for Glasgow, you well know that I am in sympathy with your scheme and hope that you will be able to carry it through. I run a general store, and the nearest railroad is 12 miles. Have to haul my freight about 4 miles from the landing point, and it is not conducive to one's well-being to go there and wait till dark and then the boat has not arrived, and you find out that it was all on account of the want of water; and when the boat does arrive it only has about half load. (James Todd, Altamaha, Ga.)

I gin about 125 bales of cotton. Practically none of this cotton goes by river though if proper and regular boat service, fully 80 per cent of this would go by water transportation. As 60 per cent of this is sea-island, the value of the shipments that would go by water would be near $10,000. I think I can safely say that good through boat service on the Altamaha River system would increase the receipts of the boats from 50 to 75 per cent and shipments from 500 to [illegible] per cent. (C. L. Youmans, Baxley, Ga.)

In regard to the increase of freight, if the boat would run regularly, I say definitely that there would be an increase of 70 or 80 per cent. It might possibly double. There are plenty of people hauling freight 12 and 15 miles from the railroad who would get it by boat if they could tell exactly what they could depend upon. Keep the boats on regular schedules and we will furnish the freight. (J. S. Tuten, Baxley, Ga.)

If we could get a regular schedule so that we could ship our products when they are ready for the market, the freight on the rivers would be double. (I. K. Reddish, Surrency, Ga.)

Would ship more freight if we had an improvement so that boats could run at all times. I have been running on these rivers for 35 years and know that they need improvement. And there is a lot of land adjoining same that would be settled up if we had good river transportation. (J. E. Youmans, Elliot, Ga.)

We need deeper water, as the boats have not been able to handle the fertilizer consigned to them this spring. A lot of the farmers haven't gotten their fertilizer yet on account of low water. (S. J. Bland, Waldow, Ga.)

Would say, if the river was put in good condition, the amount of business would be doubled. (J. D. Alexander, Lyons, Ga.)

I think the boat facilities is very much needed up here. There will be approximately $30,000 worth of naval stores to be transported by boat by me. It means a great deal to me to have a regular boat schedule. (R. J. Dyson, Hazlehurst, Ga.)

I think if the river was made better for transportation there would be more freight carried on the rivers which is now shipped by rail on account of the slow handling on the rivers. (W. F. Conley, Uvalda, Ga.)

Believe if the river was opened up and a regular schedule started that business would more than double itself. (J. M. Williams, Baxley, Ga.)

OCMULGEE RIVER.

The deepening of the Ocmulgee River to a depth of 4 or 5 feet from the water to Macon would reduce the freight rates of all kinds on the river to Savannah and Brunswick 33⅓ per cent, and would improve the business on the river 100 per cent, and all property dependent upon river transportation would be improved to almost an unlimited extent. (A. B. Russell, Abbeville, Ga.)

A regular schedule on the river would be a great help to the shippers and business would be over double what it is at this time. (M. E. Fuse, Rhine, Ga.)

We are of the opinion that if we had regular service our freight transportation would be doubled. We are largely interested in this question and would

Digitized by Google

be more than delighted to see such improvements made on the rivers as would enable boats to reach Hawkinsville on regular schedule. (Thompson Oil Co., Z. P. Peacock, manager, Hawkinsville, Ga.)

If the river was improved as you propose and a regular schedule kept, the amount of freight would be increased 500 per cent, because a great deal of that now going by railroad would go by steamer, and the farming interests as well as all other interests would be greatly benefited. Villages and prosperous towns would be built up at the nearest shipping points. (W. A. Clark, Jacksonville, Ga.)

The present business does not warrant a very large improvement; but if the river was made navigable all the year around with a deeper channel, I am quite sure that there would be an increase in business of from 300 to 500 per cent. (W. W. Lott & Co., Jacksonville, Ga.)

If there was a regular boat schedule, freights would be more than doubled. (J. O. Bland, Jacksonville, Ga.)

If the rivers were made deeper, so that larger boats could run on schedule time, the business would be more than 300 per cent larger. (George R. Wilcox, Jacksonville, Ga.)

If boats could run regularly, there would be double the amount of freight shipped by me. (H. W. Brigham, Hawkinsville, Ga.)

It is very important to this market that the river be put into such condition that boats can run regularly the year around, and it is reasonable to think that the amount of business done would be doubled. (Washburn & Polhill, Hawkinsville, Ga.)

Our business at this point has only been in operation for about a year, and that done on the Ocmulgee River has been very limited, as we were compelled to cut out this part of our territory on account of the irregularity of the boat service. We believe that if the river steamers were in a position to make regular trips we could increase our trade in that part of the country and put it on a paying basis and give a good deal of tonnage to the boat lines. (Brandon & Dreyer W. Grocery Co.)

As to the increase of shipments if there was continuous navigation, I would say that it would be more than double the present shipments, and in a short time it would show an even larger increase. (Hawkinsville Trading Co., Hawkinsville, Ga.)

OCONEE RIVER.

The improvement of the Oconee River above Dublin would increase the rafting of timber over this section about three times. (Hilton & Dodge Lumber Co., Dublin, Ga.)

My freight is very much on the increase, and with better boat transportation would double in a year or two. (R. J. Hardin, Dublin, Ga.)

Could ship a good deal more if the boat could run at all times. I hope that you will be able to improve the river, as it is badly needed. (H. C. Joyner, Dublin, Ga.)

Estimate the shipment of 50,000 tons of staves if we had the water. Started business this year. (C. C. Wilson, Milledgeville, Ga.)

In the first place, I consider the project to make navigable the year around the Altamaha River system one of the greatest projects for this territory that was ever undertaken, and I consider that the money that will be required could not be better spent. As to the increase in tonnage of freight, it is my opinion that it would increase from 500 to 1,000 per cent. There is no telling the amount of hard wood alone that is in the swamps of these rivers, and they traverse one of the finest farming countries that there is anywhere. (H. T. Hodges, indorsed by W. A. Wood, ordinary, Laurens County, Dublin, Ga.)

We think if the river was navigable at all seasons of the year, with a regular boat schedule, that we would probably ship twice as much as at present. (E. Smith & Co., Dublin, Ga.)

With continuous navigation assured, my business on the river would treble. (H. T. Jones, fertilizer dealer, Dublin, Ga.)

The uncertainty of steamer schedules, owing to the low condition of the rivers for the greater portion of the year, makes it not only advisable but necessary to make our shipments by rail, even though it cost considerably more. (J. S. Simons, Dublin, Ga.)

We beg to advise that if the boats on this river were able to run at all stages of water the river business would double or treble. (Sam Weisselbaum Co., Dublin, Ga.)

Digitized by Google

PRELIMINARY EXAMINATION OF ALTAMAHA RIVER, GA., UNDER THE ACT OF 1910.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., October 10, 1910.

SIR: In obedience to instructions contained in department letter of August 4 1910, I have the honor to submit the following report on a preliminary examination of the Altamaha River, Ga., called for by the river and harbor act approved June 25, 1910.

Inasmuch as the river and harbor act approved March 3, 1909, called for a preliminary examination and survey of the Oconee, Ocmulgee, and Altamaha Rivers, and as a complete survey of this system is now in progress and nearly completed, I was at a loss to understand why another survey was called for I assigned the duty of making the preliminary examination to Asst. Engineer E. R. Conant, and his report is transmitted herewith.

It appears from Mr. Conant's correspondence with interested parties that the object of the survey was to have particular reference to the prevention of over flow and the reclamation of land. It is believed that the information which is now being gathered in connection with the survey already authorized will furnish all the data necessary for the consideration of the construction of dikes for the improvement of navigation, and hence for their construction with reference also to land reclamation. And accordingly this question will be reported upon when the survey is completed, and it is not thought that another preliminary examination or survey is necessary.

This is not regarded as an unfavorable report; indeed, it is not any report at all upon the subject matter, but is simply an explanation as to why no preliminary examination or survey should be made at this time in response to the requirement of the act of June 25, 1910.

Very respectfully, your obedient servant,

DAN C. KINGMAN,
Assistant Engineer.

THE CHIEF OF ENGINEERS, UNITED STATES ARMY.

REPORT OF ASST. ENGINEER CONANT.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., September 29, 1910.

COLONEL: I would respectfully inclose a letter from Congressman Charles G Edwards concerning the resurvey of the Altamaha River. Upon receipt of same I wrote a letter to each of the parties mentioned by him, asking them to state what was desired in the way of a further examination of the river. The only reply received was from Mr. McQueen.

Mr. Edwards states that the object of the survey is to ascertain the feasibility of constructing a system of dikes for the purpose of stopping overflow and to make a special study of the cause and prevention of overflow at Bulls Cut.

The present survey of the river will cover any special examination required in the vicinity of Bulls Cut, and in my opinion sufficient data will be collected to show whether a system of dikes for confining this stream flow is practicable and warranted as a means of aiding navigation.

Very respectfuly, your obedient servant,

E. R. CONANT,
Assistant Engineer.

Col. DAN C. KINGMAN,
Corps of Engineers, United States Army.

LETTER OF HON. CHARLES G. EDWARDS.

SAVANNAH, GA., *September 14, 1910.*

DEAR SIR: In re survey Altamaha River, last bill, your letter of 12th received and noted.

The object of this is twofold: (1) To improve navigation by stopping overflow by system of dikes to confine stream to its own course, and (2) to pre-

Digitized by Google

vent if possible the overflow at what is known as Bulls Cut, at a point near the Atlantic Coast Line Bridge, in Liberty County, and to reclaim that great amount of waste land caused by such overflow.

Parties who are familiar with these conditions are Hons. N. McQueen and J. C. McDonald, Ludowici, Ga., and E. M. Thorpe, at Townsend, Ga. They can give you names of many others.

I believe that by confining the volume of water to its own channel and not permitting it to escape and flow across the county, never returning to the Altamaha, but going into South Newport River at a point in McIntosh County, would decidedly tend to scour out the bed of the Altamaha and would incidentally have the effect of reclaiming the waste land.

Hope a favorable report will be made.

Yours, truly, CHAS. G. EDWARDS, *M. C., Georgia.*

Mr. E. R. CONANT,
Assistant Engineer.

O

Digitized by Google

Digitized by Google

APPENDIX A.

BANK REVETMENT CONSTRUCTED BELOW MACON, 1909.

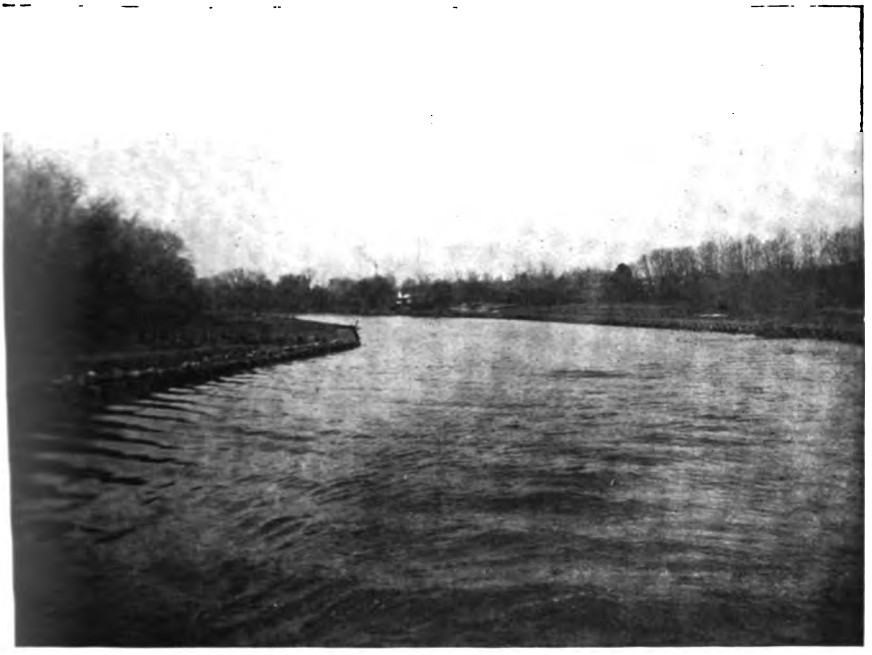
BANK REVETMENT CONSTRUCTED BELOW MACON, 1907.

Digitized by Google

TRAINING WALL AT MACON, GA.

TRAINING WALL BELOW MACON, GA.

Digitized by Google



TRAINING WALL AND SPUR DAM BELOW MACON, GA.

IMPROVED CHANNEL THROUGH CARR SHOAL, OCONEE RIVER; WORST SHOAL ON THREE RIVERS.

Digitized by Google

TYPE OF SLOUGHING BANK, OCONEE RIVER.

TYPE OF BADLY ERODING BANK, OCONEE RIVER.

Digitized by Google

TYPE OF MODERATELY CAVING BANK, OCMULGEE RIVER.

TYPE OF MODERATELY CAVING BANK, ALTAMAHA RIVER.

Digitized by Google

CHARACTERISTIC STABLE BANK, CLAY FORMATION, OCMULGEE RIVER.

WHARF, ELEVATOR, AND WAREHOUSE, DOCTORTOWN, ALTAMAHA RIVER.

Digitized by Google

CHARACTERISTIC LANDING, WITH STOREHOUSE, OCMULGEE RIVER.

CHARACTERISTIC LANDING AND STOREHOUSE, OCONEE RIVER.

Digitized by Google

CHARACTERISTIC LANDING, ALTAMAHA RIVER.

LANDING, ELEVATOR, AND WAREHOUSE, DUBLIN, OCONEE RIVER.

Digitized by Google

GENERAL TYPE OF RIVER BOAT.

RIVER BOAT, OCMULGEE RIVER.

Digitized by Google

CHARACTERISTIC CUT-OFF TO BE OPENED.

CHARACTERISTIC VIEW OF OCMULGEE RIVER ABOVE LUMBER CITY, GA.

Digitized by Google

CHARACTERISTIC VIEW OF OCONEE RIVER 15 MILES BELOW DUBLIN, GA.

CHARACTERISTIC VIEW OF THE ALTAMAHA RIVER—"THE NARROWS."

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 450.

PETOSKEY HARBOR, MICH.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF PETOSKEY HARBOR, MICH.

JANUARY 13, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 12, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 11th instant, together with copy of a report from Lieut. Col. C. S. Riché, Corps of Engineers, dated September 21, 1911, of a preliminary examination of Petoskey Harbor, Mich., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 11, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated September 21, 1911, by Lieut. Col. C. S. Riché, Corps of Engineers, on preliminary examination of Petoskey Harbor, Mich., as called for by the river and harbor act of February 27, 1911.

Petoskey Harbor is on the south shore of Little Traverse Bay, near the northern end of Lake Michigan. This harbor has been previously

Digitized by Google

improved by the United States, a breakwater 1,345 feet long extending out to the 31-foot contour having been constructed to protect the landing pier from dangerous seas.

This examination is made to determine the advisability of a further extension of the breakwater with funds appropriated for that purpose in the river and harbor act of June 25, 1910. Experience shows that the extension is not now required and local interests desire that the appropriation be used for dredging out certain accumulations in the harbor, but the district officer believes that the desired dredging should be done by local interests. He recommends that the breakwater be not extended and that available funds be reserved for maintenance and repair of the existing breakwater. The views and recommendation of the district officer are concurred in by the division engineer.

As required by law, this report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated October 30, 1911, concurring in the opinion of the district officer and division engineer that the commerce of the harbor is insufficient to justify the United States in undertaking any improvement other that the maintenance of the existing breakwater, and that no extension of this breakwater should be made.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer and the Board of Engineers for Rivers and Harbors that the breakwater be not extended and that the funds appropriated by the act of 1910 be reserved for its maintenance and repair, and therefore, in carrying out the instructions of Congress, I report that at this time further improvement by the United States of Petoskey Harbor, Mich., is not deemed advisable, and I recommend that the present project, which involves further extension of the breakwater, be modified by legislative action in accordance with this report. Such legislative action will give to the improvement a definite legislative status and definite sanction for the reservation of funds now available until such time as their expenditure for maintenance of the breakwater is necessary.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF PETOSKEY HARBOR, MICH.

UNITED STATES ENGINEER OFFICE,
Grand Rapids, Mich., September 21, 1911

SIR: 1. In accordance with the directions of department letter of April 7, 1911, I have the honor to report as follows upon the preliminary examination of Petoskey Harbor, Mich., required by the act of Congress approved February 27, 1911.

The act states nothing whatever as to the nature or extent of the required report, beyond the title.

Digitized by Google

2. Petoskey Harbor is on the south shore of Little Traverse Bay, near its inner end. The nearest harbor to the south is Charlevoix Harbor, 14 miles west and 4 miles south of Petoskey. Harbor Springs, on the north shore of Little Traverse Bay, about 4 miles north of Petoskey, is a small but fine harbor of refuge, affording security in any weather. Little Traverse Bay is about 11 miles long, east and west, narrowing from 10 miles in width at its entrance to 2 miles at the head or east end of the bay. Petoskey is a city with a population of 6,500; it has a large summer-resort business and is surrounded by a number of very popular and prosperous resorts. It has two railroads, the Grand Rapids & Indiana and the Pere Marquette. The general location of the harbor and its relation to the other harbors is shown on Lake Survey Chart No. 71, "North East end of Lake Michigan, including Grand and Little Traverse Bays"; the details are shown on a print[1] (positive Van Dyke) herewith of the survey of May 29 to June 9, 1911.

3. In a report of survey of Petoskey Harbor for the construction of a "breakwater and harbor of refuge," under date of December 21, 1889 (Annual Report, Chief of Engineers, 1890, p., 2673), Maj. William Ludlow describes the locality and its needs, as follows:

Little Traverse Bay, upon the south shore of which Petoskey is situated, lies open to the winds from west to northwest, and the landing in front of the village is directly exposed to the fierce gales from that quarter; but immediately across the bay, and but 4 miles distant from Petoskey, is the excellent natural harbor of Harbor Springs, affording perfect security in any weather. It is evident, therefore, that so far as the general navigation is concerned, there is no need for the construction of an artificial harbor of refuge in front of Petoskey.

On this point Capt. Lockwood, in pursuance of a provision in the river and harbor act of July 5, 1884, for an examination of Petoskey "with a view to constructing a harbor of refuge," reported as follows, under date of October 25, 1884:

"Little Traverse Bay is between 20 and 25 miles south of Waugoshance Light, which marks the western entrance to the Straits of Mackinac. Its general direction is east and west, and it is exposed directly to winds from the northwest around to southwest. The shores are bold and in most places rocky.

"I do not consider the locality worthy of improvement for the following reasons:

"(1) There already exists on the north shore of the bay, and about 5 miles from Petoskey, a natural harbor of refuge, which is sheltered from winds from the north around to southwest. During the past summer a lighthouse was built to mark the entrance, which is an easy one, with a sufficient depth of water to admit the largest vessels on the lake.

"(2) Little Traverse Bay is so far to the east of the course taken by vessels bound from the Straits of Mackinac to the different ports of Lake Michigan, or vice versa, that in nearly if not in all cases such vessels would find it more to their advantage to seek shelter under the lee of the islands or in Grand Traverse Bay than in Little Traverse Bay, even if an additional place of refuge existed at its head.

"The harbor at Harbor Springs is sufficient for the present needs of commerce, and as its use is, and will continue to be, confined to vessels engaged in the coasting trade only, there is little fear but that it will answer for years to come all the demands that may be made upon its capacity.

"To establish a harbor of refuge on the south shore of the bay near Petoskey would require the construction of an extensive breakwater, which would have to be built in deep water in order to secure the requisite area for shelter. If located at Petoskey it would serve to protect the piers used by steamboats during the summer; but, except in special cases, would offer no advantages over Harbor Springs Harbor as a refuge in bad weather."

Following the provisions of the act of August 11, 1888, Lieut. Col. Mansfield reported, October 23, 1888, as follows:

"Petoskey is a small village of 3,500 people, occupying a picturesque site on the bluffs overlooking Little Traverse Bay and near its head. The bluffs descend almost vertically to the narrow gravelly beach of the bay, which here is fully exposed to the

[1] Not printed.

Digitized by Google

winds from the north and northwest. The present and prospective business of the place is small, and it is chiefly noted as a popular summer resort, and, being at the terminus of an important railroad, is a point of departure to numerous like resorts in the neighborhood of the Straits of Mackinac, between which places small steamers ply during the season, while during the past season one large steamer has made regular trips there from Chicago.

"During high winds from the north and west these vessels find it difficult to make a landing at the one small dock at Petoskey, and at times find it impossible to do so and must seek shelter in the commodious natural harbor 3 miles across the bay. This harbor at Harbor Springs is one of the finest harbors of refuge on the Lakes, and therefore a harbor of refuge at Petoskey is not called for in the general interests of commerce.

"All that it requires is a breakwater to insure a safe and certain landing place in all weather for these vessels."

In the general view indicated by these reports I concur. In fact, it is evident from the communication from the village authorities, dated October 15, 1888, which was originally forwarded with Col. Mansfield's report, and a copy of which is inclosed herewith, that the primary object sought is the protection of the landing wharf in front of the village, in the interest of the considerable shipments from and to adjacent localities, and the large number of passengers carried by the steamers that touch there.

From the fact that the first wharf built was almost immediately destroyed by the sea and that apprehensions are felt for the security of the existing one, it would seem that the methods of construction were too economical, considering the rocky slope of the bottom and the exposure to northwest gales; since, no doubt, a landing wharf, if built out from the shore of solid cribwork, properly ballasted, with a return or "L" at its outer end, extending eastward, of such length as to furnish shelter against a sea running from the north and west, and reliable means of making fast, should be at least as stable as a "breakwater" of similar construction in deeper water, and exposing the full length of its side to the impact and action of the sea.

Were the question one merely of furnishing safe landing facilities at Petoskey, the most obvious and least expensive method would be to rebuild the existing wharf as above indicated. What is asked, however, is not the reconstruction of the present wharf, but the construction of an outer and detached work, so designed as to shelter the landing and possibly to furnish additional area within which vessels could take shelter on occasion.

Westward from the landing wharf is a projection of the shore line where a line of detached cribs has been already built, and which would afford a favorable starting point for the "breakwater."

4. Before work at this harbor was begun by the United States there existed a landing pier, which was exposed to winds coming from between west and northwest, making it dangerous to attempt to make a landing during storms. A project was adopted by act of Congress of August 17, 1894, which provided for constructing a breakwater 600 feet long about 600 feet west of the outer end of the landing pier, and another north of the landing pier 500 feet long, or as much longer as might be found necessary to cover the landing from dangerous seas, at an estimated cost of $170,000. Work under this project was begun in 1896.

5. In 1902 the west breakwater had been built for a length of 400 feet and the north breakwater for a length of 200 feet. It being found that the entrance opening of 150 feet between the two breakwaters was too narrow, and that the north breakwater was too near the landing pier, the project was modified by act of Congress of June 13, 1902, so as to provide for the removal of the north breakwater and the extension of the west breakwater, the final cost not to exceed the amount estimated, $170,000, to complete the original project. Up to June 30, 1911, there has been expended by the United States $125,771.45, of which $118,239.40 was for new work and $7,532.05 for maintenance.

6. The timber portion of the breakwater was built from 1895 to 1907; the stone portion connecting the inner end of the timberwork with the outer end of the old detached cribs was built in 1897, and

Digitized by Google

in 1907 the stone portion was extended to the shore on the line, and making use of the old detached cribs. The breakwater now has a total length of 1,345 feet, of which 445 feet at the shore end is stonework, and the outer 900 feet of timber cribwork on a stone foundation. The breakwater ends in a depth of water of 31 feet below zero of gauge, at a distance of 1,290 feet from the shore line, and 300 feet beyond the 30-foot curve, reaching an excessive depth as compared with any similar structure in this district.

7. There is one landing pier, owned or controlled by the Northern Michigan Transportation Co., and used by all vessels coming to this harbor. There is no connection with either of the railroads. This pier has been extended, without authority, 103 feet since 1895, leaving a clear distance of only about 490 feet to the breakwater, where there had formerly been 590 feet. The pier ends in a depth below zero of gauge of about 16 feet of water at a distance of about 700 feet from the shore line. A comparison of the soundings made in 1889 and in 1911, the only detailed soundings of this harbor, shows a considerable shoaling of the harbor area inside of the 15-foot curve. On account of the dams and ponds near the mouth of Bear Creek it is improbable that any considerable shoaling is due to sediment from this source; a very small amount of shoaling may be due to sewers, drains, etc., but it is believed that it is largely due to fine refuse material from a stone quarry, which is dumped in large quantities into the harbor at a point about 1,000 feet east of the shore end of the landing pier. The presence of this soft material on the original hard bottom of the bay is easily recognized and has extended out far enough to affect the available navigable depths at the end of the landing pier.

8. The reasons for and object of this preliminary examination may be found in my letter of November 23, 1910, to the Chief of Engineers, and in the fifth indorsement to E. D. 9199/41, which are as follows:

GRAND RAPIDS, MICH., *November 23, 1910.*

SIR: In regard to the proposed expenditure of $15,000 for extending the breakwater at Petoskey Harbor, Mich., 100 linear feet during 1911 in accordance with subproject approved July 20, 1910, I have the honor to submit the following:

As stated in annual report for 1890, page 2668, all that was desired was a breakwater to protect the landing pier, the fine harbor near by, at Harbor Springs, making a harbor of refuge at Petoskey unnecessary. The first plan was a west breakwater, with outer end about 850 feet from the shore line and about 650 feet from the outer end of the landing pier, and a north breakwater extending easterly from the outer end of the west breakwater and with an opening of 150 feet between the two breakwaters. In 1895–96, 400 feet of the west and 200 feet of the north breakwater were so built. In 1897 the inner end of the 400 feet of west breakwater was connected with the outer, private, timber crib by 200 feet of stone breakwater. It was then expected to extend the north breakwater 400 feet and close the opening between the two breakwaters. The above work was done under the act of August 17, 1894, which provided for "the construction of an outer and detached work, so designed as to shelter the landing and possibly to furnish additional area within which vessels could take shelter on occasion."

The act of June 13, 1902, gave authority to remove the 200 feet of the north breakwater, as it was too close to the outer end of the city wharf and the entrance between the two breakwaters too contracted. This was done in 1905, and the two cribs were placed in the extension of the west breakwater; the west breakwater has since been extended by three 100-foot cribs (in 1905, 1906, and 1907), making a present total length of 1,345 feet, of which 445 feet is stonework and 900 feet cribwork.

The breakwater extends nearly north and south and so is practically at right angles to the direction of all seas that can do much damage. Its outer end extends 175 feet (300 feet by survey of June, 1911) beyond the 30-foot curve and about 375 feet beyond a line from the northwest corner of the landing pier tangent to the projecting portion

Digitized by Google

of the north shore line of Little Traverse Bay, the tangent point being only 6 miles distant. Thus the breakwater and the sheltering north shore of the bay make a very complete protection to the one landing pier, which still furnishes all the accommodations needed for the very small amount of commerce to be served, the same as it did 14 years ago, when the breakwater first became effective. Until there is more commerce and more landing piers to be protected, there seems no reason for further extension of the breakwater, as the harbor is never likely to be used as a harbor of refuge, due to the near-by harbor at Harbor Springs, as noted in paragraph 2, and also due to the nature of the bottom, which is too hard to provide anchorage. That the breakwater as it now is serves all the needs of this harbor is attested by a letter from the general manager of the boat line owning the one landing pier (copy herewith) and by statements made by prominent citizens and officials at a public hearing held by me at Petoskey, Mich., on November 8, that the local interests do not care for a further extension and requesting that it be not made at present.

The further extension of the breakwater at the present time being not only unnecessary but undesirable, I respectfully recommend that the project be modified by omitting the construction of the 100 linear feet of breakwater and reserving the $15,000 for future use as may be needed.

Very respectfully, your obedient servant,

C. S. Riché,
Major, Corps of Engineers

The Chief of Engineers, United States Army.

[Fifth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, March 13, 1911

Respectfully returned to Lieut. Col. Riché.

In view of the recommendation made in Col. Riché's letter of November 23, 1910, this subproject is modified by omitting for the present the further extension of the breakwater contemplated herein.

Attention is invited to the provision in section 2 of the river and harbor act of February 27, 1911, for examination of Petoskey Harbor, Mich. The chairman of the Committee on Rivers and Harbors of the House of Representatives was informed by the Chief of Engineers on December 5, 1910, that, pending action on this examination, the amount available could be held for such future use as might be necessary.

By command of the Chief of Engineers:

E. N. Johnston,
Captain, Corps of Engineers.

9. The desires of interested parties in regard to any changes in the methods or extent of the improvement are shown in the appended copies of letters and reports. Referring to the letters of April–May, 1910, the local interests suggested that the most desirable use of the appropriation in the then pending river and harbor bill would be for: (*a*) Dredging the interior portion of the harbor, (*b*) removing a section of the stone breakwater near the shore so as to admit a current into the harbor, and (*c*) repairing the damaged portion of the stone breakwater. Items (*a*) and (*b*) were desired principally for reasons of health to the general community and item (*a*) partly for improvement of navigation. These matters were reported upon by me under date of May 31, 1910, copy appended.

10. During the present season the necessary repairs were made to the stone portion of the breakwater and the requested opening near the shore line was made between two of the old detached cribs, thus providing for a current between the open lake and the harbor; the local interests have expressed entire satisfaction with this work. In regard to dredging the interior portion of the harbor my report of May 31, 1910, paragraph 3, states:

The bottom inside of the breakwater and around the landing pier is stony, and dredging or deepening any part of the area inside of the breakwater has never been contemplated and is not proposed by the project.

Digitized by Google

11. The further correspondence appended to this report shows a practical agreement by all the local interests from whom expression of opinion could be obtained that the existing breakwater is ample for present needs, that the main interest to be served at this harbor is the transportation of passengers and not of freight, that the present use of the harbor is practically in the hands of one transportation company as being the owner of the only landing pier, and that the appropriation be reserved for future repairs as may be required. The transportation company further urges dredging between the breakwater and the shore where the water is too shallow for navigation. Two suggestions are presented for future terminal dock construction: One dock to be built under municipal control in the portion of the harbor sheltered by the existing breakwater and to provide for all the commerce using the harbor. The other is for a possible pier to be built so far away as to receive little shelter from the existing breakwater and to serve the uses of a single interest; if built an extensive lengthening of the breakwater would be required to provide protection for this single pier.

12. As already stated the freight traffic through this harbor is very small. As compared with other harbors on the east shore of Lake Michigan, Petoskey, Pentwater, Portage Lake, and Arcadia Harbors form a class by themselves, with annual receipts and shipments of from about 1,000 to less than 5,000 short tons of freight per year, as shown by the reports of commercial statistics in the annual reports of the Chief of Engineers. While these statistics may be neither complete nor accurate they are the best that could be obtained year by year, and at least serve in a general way for comparison. Such receipts and shipments for Petoskey Harbor for the past three years are as follows:

	Tons.
Calendar year 1908	858
Calendar year 1909	3,250
Calendar year 1910	2,687

13. The existing breakwater serves all the present and prospective needs of the harbor, and in providing this breakwater the General Government has done everything necessary for a harbor. The construction of landing piers and terminal facilities must be provided here, as elsewhere, by the local interests. And the dredging of accumulations in the harbor, and at the private landing pier, caused by local shore conditions, should be provided for by the local interests, the same as is done elsewhere in regard to dredging at private docks and slips. There is ample room in the sheltered portion of the harbor for a dock with railroad tracks, warehouses, etc., which could be used by all interests on equal terms and provide adequate facilities for all the present, or probable future, commerce of this place. And this should be done and the possible benefits of the existing breakwater availed of before further extension of same is made. That this is within the province of the municipality is shown by the following extract from the laws of the State of Michigan as given in Chapter XVII "Harbors, wharves, and harbor masters," page 980, of Volume I of "The compiled laws of the State of Michigan, 1897:"

(3143) SECTION 1. The council of any city located upon or adjacent to any of the navigable waters of the State shall have the power to establish, construct, maintain, and control public wharves, docks, piers, landing places and levees, basins, and canals,

Digitized by Google

upon any lands or property belonging to or under the control of the city; and for that purpose the city shall have the use or control of the shore or bank of any lake, river, or other waters within the city, not the property of individuals, to the extent to which the State can grant the same, and the council may lease wharfing and landing privileges upon any of the public wharves, docks, or landings, but not for a longer time than five years, and in such manner as to preserve the right of all persons to a free passage over the same with their baggage.

(3144) SEC. 2. The council shall have authority also to require and cause all docks, wharves, and landings, whether upon public grounds or upon the property of private individuals, to be constructed of such material and in such manner and maintained in conformity with such grade as may be established therefor by the council, and prescribe the line beyond which any such wharf, dock, or landing shall not be constructed or maintained.

(3145) SEC. 3. The council shall have authority to prohibit the encumbering of the public wharves and landings, and to regulate the use of all wharves, docks, and landing places within the city; regulate the use and location of wharf boats; and to regulate and prescribe the rates and charges for landing, wharfage, and dockage at all public and private wharves, docks and landings, and to collect wharfage and dockage from boats, water craft, and floats landing or using any public landing place, wharf, or dock within the city.

(3146) SEC. 4. The council shall have authority to provide by ordinance for the preservation of the purity of the waters of any harbor, river, or other water within the city, and within one-half of a mile from the corporate boundaries thereof; to prohibit and punish the casting or depositing therein of any filth, logs, floating matter, or any injurious thing; to control and regulate the anchorage, moorage, and management of all boats, water craft, and floats within the jurisdiction of the city; to prescribe the mode and speed of entering and leaving the harbor, and of coming to and departing from the docks, wharves, and landings, by boats, water craft, and floats, and to regulate and prescribe, by such ordinances or through a harbor master or other officer, such location for any boat, craft, vessel, or float, and such changes of station in and use of the harbor as may be required to promote order therein, and the safety and convenience of all such boats, craft, vessels, and floats, and generally to enact and enforce such ordinances and regulations not inconsistent with the laws of the United States and of this State as in the opinion of the council shall be most conducive to the orderly, safe, and convenient use and occupancy of the harbor, navigable waters, wharves, docks, piers, and landing places within the city.

This law is here quoted at length in order to put clearly on record the authority which each municipality has over harbor structures and over conditions connected with the harbor which may affect the health of the community.

14. As shown above, the further extension of the breakwater is unnecessary, and I have, therefore, the honor to recommend that the project be modified to omit further extension and reserve the funds already appropriated to be used for maintenance and repair of the breakwater as may be required, that no change be made in the project to provide for dredging within the harbor, and that no survey be made.

15. No questions of water power, forestation, or flood protection are involved in this examination.

16. In accordance with the directions of paragraph (e), page 4, of Circular 12, series of 1911, from the Office of the Chief of Engineers, notice has been sent to parties known to be specially interested in the proposed improvement that the Board of Engineers for Rivers and Harbors should be furnished with any further statement or argument which they desire to make.

Very respectfully, your obedient servant,

C. S. RICHÉ,
Lieut. Col., Corps of Engineers.

THE CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

Digitized by Google

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., October 2, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I am of the opinion that this locality is not worthy of further improvement by the United States at the present time, and therefore concur in the recommendations of the district officer contained in paragraph 14 of his report.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 30, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The project for the improvement of Petoskey Harbor, as originally adopted in 1894, provided for the construction of a breakwater 600 feet long about 600 feet west of the outer end of the landing pier, and another north of it 500 feet long, or as much longer as might be found necessary. By 1902 the west breakwater had been built for a length of 400 feet and the north breakwater for a length of 200 feet. Investigation having shown that the north breakwater was too near the wharf and that the entrance between the breakwaters was too narrow, the project was modified to provide for the removal of the north breakwater and the extension of the west breakwater, the final cost not to exceed the estimated cost of the original project, $170,000. The breakwater now has a length of 1,345 feet, reaching to the 31-foot contour. The total expenditures to June 30, 1911, amounted to $125,771.45.

One purpose of the present investigation appears to be to determine the advisability of the further extension of the breakwater. The district officer believes that such extension is inadvisable, and in a special report on the subject submitted prior to the present inquiry, he recommended that the project be modified to omit further extension. He has taken the matter up anew with local interests, and his views in this regard meet with general approval. It is the wish of these interests, however, that available funds be expended in dredging the interior portion of the harbor where shoaling has occurred. The district officer is of opinion that the dredging of accumulations in the harbor and at the private landing pier, caused by local shore conditions, should be provided for by local interests.

The commerce of the locality is quite small, being reported at from 58 to 3,250 tons per annum. Compared with this commerce the expenditures made on the harbor by the General Government have been large. The existing breakwater adequately serves all present and prospective needs of commerce and affords ample room in sheltered portions of the harbor for the construction of suitable wharves and terminals. The present project contains no provision for dredging, and the board believes, in concurrence with the district officer

Digitized by Google

and division engineer, that the commerce of the harbor is insufficient to justify the United States in undertaking any improvement other than the maintenance of the existing breakwater. No extension of this breakwater is recommended.

No communications have been received from interested parties who were invited by the district officer to submit statements and arguments to the board, but consideration has been given to copies of correspondence attached to the within report. Existing wharves and the terminal facilities deemed requisite for the proper accommodation of commerce are described by the district officer. No questions of water power or other related subjects have any material bearing upon the improvements herein considered.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF HON. GEO. A. LOUD.

WASHINGTON, D. C., *May 9, 1910.*

MY DEAR GENERAL: I am inclosing herewith a copy of resolutions just received from the city council of Petoskey, Mich., suggesting certain methods of improvement in connection with the breakwater and cleaning of the bottom of harbor. Will you kindly give to these resolutions your kind consideration, and after the matter has been investigated, will be glad to have a letter giving the results of the investigation.

I am, very sincerely, yours, GEO. A. LOUD.

Gen. WILLIAM L. MARSHALL,
Chief of Engineers, United States Army.

RESOLUTION OF THE COMMON COUNCIL OF THE CITY OF PETOSKEY.

By Alderman Fisher:

Whereas a bill has been introduced into the Congress of the United States appropriating a large sum of money for the improvement or extension of the Petoskey Breakwater.

And whereas numerous representations have been made to this body by citizens of the city of Petoskey that the comfort, necessities, and health of the community will be best subserved by the expenditure of such proposed appropriation in the cleaning of the bottom of the harbor inside of the breakwater by the removal of the sand therefrom, and by the removal of a section of said breakwater near the shore end thereof for the purpose of admitting a current of water through said harbor, and by the repair of the old crib and the building it up to the level of the new one, and the connecting the two portions by a footway of some suitable design; Therefore be it

Resolved, That the city clerk be, and he is hereby, directed to transmit a certified copy of these resolutions to the Hon. Julius Caesar Burrows and to the Hon. William Alden Smith, United States Senators from Michigan, and the Hon. George A. Loud, Congressman from the Tenth district of the State of Michigan.

Adopted: Ayes—Aldermen Crawford, Fisher, Fisk, Gray, Grimes, Hirschman, Martin, and Wixson; nays, none.

I hereby certify the above is a true copy of a resolution as passed by the common council on the 2d day of May, 1910.

[SEAL.]

FRED D. ELY,
City Clerk, Petoskey, Mich.

LETTER OF PETOSKEY BOAT CO.

PETOSKEY, MICH., *April 28, 1910.*

DEAR SIR: We are located here on Little Traverse Bay, and we notice there has been appropriations made by Congress to do some Government work on the breakwater at this harbor. In view of this fact, we would suggest that you use your influence in using a portion of this appropriation in making the following improvements. The stonework which leads from the shore end of the breakwater should have an opening

Digitized by Google

in it to allow a circulation of water in the harbor; this opening we would suggest to be from 20 to 30 feet in width and placed about midway between the shore and breakwater; over this opening there should be a bridge to allow a foot passage to the breakwater. The balance of the stonework should be cemented to hold it permanently in place. On account of there being practically no circulation of water in the harbor it is fast filling up with sand and mud, so that it is getting to be a difficult operation for some of the Lake steamers to make a landing. We would suggest that a sand sucker be sent here as soon as practicable and clean out the harbor before the usual summer traffic commences. With the harbor once cleaned and an opening made in the stonework as mentioned, we believe this will make a circulation of water through the harbor that will keep it clean. As it now is, the water is more or less stagnant.

We also believe that a good light would be acceptable and a benefit to commerce and business.

The above we merely offer as suggestions, but know if the improvements mentioned were carried out they would be very much appreciated by every loyal citizen of our city.

Trusting, if the above suggestions are worthy of your consideration, you will use your influence in having them carried out,

We remain, very respectfully, yours,

PETOSKEY BOAT CO.

Hon. GEO. A. LOUD.

UNITED STATES ENGINEER OFFICE,
Grand Rapids, Mich., May 31, 1910.

SIR: I have the honor to submit the following report with reference to the letter of Mr. George A. Loud, M. C., dated May 9, 1910, to the Chief of Engineers, on the subject of certain methods to be followed in future improvements of the harbor of Petoskey, Mich., as advocated by the city council of Petoskey in the resolution dated May 2, 1910, which letter was referred to me for report by indorsement dated May 13, 1910.

The adopted project for the improvement of Petoskey Harbor provides for the construction of a breakwater, the object of which is to cover the existing landing pier from all dangerous seas.

The bottom inside of the breakwater and around the landing pier is stony, and dredging or deepening any part of the area inside of the breakwater has never been contemplated and is not proposed by the project.

Originally the inshore end of the breakwater was about 220 feet from the shore. (See Annual Report Chief of Engineers for 1896, p. 2718.) The gap between the breakwater and the shore was partly occupied by a number of small isolated cribs built by local enterprise at an earlier time, and the report referred to states that the plan contemplated reducing or closing this gap if it be found that it permits the entrance of troublesome seas. The gap was finally closed in 1907 by filling the intervals between the small old cribs with stone, the top of the stone reaching to the level of 4 feet above zero of the harbor gauge. It may be stated that this action is understood to have been taken upon urgent appeals to the officer in charge by local interests. One letter[1] by Col. Adams, referring to the very objection now brought forward by the city council of Petoskey, is on record.

The stone portion of the breakwater, extending from the shore over the small old cribs to the timber crib work built by the Government has been seriously damaged by the sea, and it had been proposed to use part of the next appropriation for its repairs. (See Annual Report Chief of Engineers, 1909, p. 752.) It now appears that the local interests would be better subserved if the intervals between the old cribs were again opened in order to secure a serviceable current through the harbor. It would be very difficult and costly, however, to do any dredging in this harbor, owing to the stony nature of its bottom. The deposits of which complaint is made probably come from Bear Creek, which discharges into the harbor, and it is suggested that some method might be devised by the city of Petoskey by which they could be diverted so as not to affect the condition of the harbor.

The footway over the old cribs from the shore to the permanent breakwater, which is advocated in the resolution, can not be regarded as in any sense advantageous for the maintenance of the harbor.

A map showing the location and present extent of the works of improvement, the landing pier, and the mouth of Bear Creek is inclosed.

Very respectfully, your obedient servant,

C. S. RICHÉ,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

---

[1] Not printed.

Digitized by Google

LETTER OF ASST. ENGINEER L. W. GODDARD.

UNITED STATES ENGINEER OFFICE,
Grand Rapids, Mich., October 8, 1910.

SIR: The work proposed for the coming year at Petoskey Harbor provides for extending the breakwater 100 feet and for repairing the stone portion of the breakwater at, and adjacent to, the inner end of the cribwork.

The outer end of the breakwater is now nearly 200 feet (300 feet by survey of June, 1911), outside of the 30-foot curve, and, together with the projecting shore to the northwest, shelters a far larger area than is ever likely to be used for harbor purposes. In view of these conditions it seems probable that the farther extension of the breakwater will be of little or no benefit to the harbor. As your company is practically the sole user of the harbor for commercial purposes, your early opinion is respectfully requested as to the needs of, and benefits to be derived from, an extension of the breakwater.

While at Petoskey, October 1, it was noted that the water in nearly the whole harbor area had a pronounced yellow color where clear lake water was to be expected, the same as existed on the west side of the breakwater. The material causing this discoloration appeared to come from two dumps of waste material at the quarries along the shore on the harbor side of the breakwater. You are requested to state whether or not, in your judgment, enough of this waste material is carried into the harbor area to affect the navigable depths.

For and in the absence of Maj. C. S. Riche.

Very respectfully,

L. W. GODDARD,
Assistant Engineer.

Mr. E. W. SEYMOUR,
Secretary and General Manager Northern Michigan Transportation Co.,
Chicago, Ill.

LETTER OF NORTHERN MICHIGAN TRANSPORTATION CO.

CHICAGO, ILL., *October 4, 1910.*

DEAR SIR: Replying to yours of October 3, in my opinion, to extend the present breakwater any farther would be more of a detriment than a protection to Petoskey Harbor. The present breakwater is acting as a catch basin at the present time, as there is no way for any sewage or any refuse that is deposited or carried down by that little creek just west of our property to get out into the lake. When we built our new addition to our present dock we had 22[1] feet of water at the end and 250 feet from the end we had 16 feet of water, and now we have scarcely 16 feet at the end and 9 feet 250 feet from the dock. There certainly ought to be something done for the sewage, refuse from the street, from washouts from the hills, from limekilns, and from other sources, or we will not be able to enter behind the breakwater in a few years.

If it is necessary for a complaint to be made to your department before any steps are taken to prohibit or change such conditions, you may consider me as a complainant, and if there is any particular way that you wish the complaint made I would only be too glad to comply, but the more breakwater you have at the present time the greater will be the accumulation of sewage, rubbish, and everything else to fill it in.

Yours, very truly,

E. W. SEYMOUR,
General Manager

Asst. Engineer L. W. GODDARD,
United States Engineer Office, Grand Rapids, Mich.

---

[1] Only 16½ feet at end and 14.8 feet at a distance of 75 feet from the end in 1899, prior to the extension referred to.

Digitized by Google

LETTER OF MICHIGAN LIME CO.

PETOSKEY, MICH., *August 19, 1911.*

DEAR SIR: Your kind favor of the 18th instant is received and we are appreciative of your courtesy in asking our opinion as to the further extension of the breakwater.

Our company is interested, and we prefer to see this extension made, and we are asking this, looking forward to the protection of a pier which we have contemplated building. It is our thought to put in a coal dock, in which instance we feel the city would greatly benefit through a lower average price for coal. Also, from a public standpoint, we feel that under present conditions the Northern Michigan Transportation Co.'s dock largely absorbs the present harbor. As this pier is not only owned privately but by an outside corporation we feel that the present dock facilities do not well serve the city, particularly from the standpoint of incoming and outgoing freight, the present owners owing a boat line given up almost entirely to passengers and light packet freight. For instance, our company in former years shipped from one-eighth to one-tenth of its entire product by water, but the transportation company have raised its rates with the frank acknowledgment to us that they preferred not to handle lime.

These are some of the reasons why we prefer to see the harbor enlarged.

Yours, truly,

MICHIGAN LIME CO.
MORGAN CURTIS, *Secretary and Manager.*

Lieut. Col. C. S. RICHE,
U. S. Engineer Office, Grand Rapids, Mich.

LETTER OF NORTHERN MICHIGAN TRANSPORTATION CO.

CHICAGO, ILL., *August 24, 1911.*

DEAR SIR: Your letter of August reached here while I was absent from my office. It seems to me that the present breakwater at Petoskey is all that is required for a few years to come, as I can not see what Petoskey is going to offer in the way of tonnage to any steamer lines any more than passengers and merchandise freight going into Petoskey and some fruits and manufactured stuff being shipped out. It is more essential that there be some dredging done inside of the breakwater, as it is getting quite shallow in places. The sewerage emptying behind the breakwater as well as the sand and other refuse that the little creek deposits there and some other causes, which is filling up very fast. If the Government has any money to spend I would think that would be the most valuable way to use it, in dredging the bottom between the breakwater and the shore where the water is almost too shallow for navigation.

Yours, truly,

E. W. SEYMOUR, *General Manager.*

C. S. RICHÉ,
Lieutenant Colonel, Corps of Engineers.

LETTER OF CITY ELECTRIC LIGHT PLANT.

PETOSKEY, MICH., *August 28, 1911.*

DEAR SIR: Your inquiry of the 18th instant was duly received regarding Petoskey Harbor. I believe that your resolve to not extend the breakwater at this time, but to reserve the money appropriated for current repairs is wise, of course eventually leading to a concrete superstructure. The demands of commerce in this harbor are not fully shown by reports furnished you by private individuals. The dock is owned by private individuals and the city is at present trying to devise ways and means whereby it can construct a dock of its own, and thus allow the passenger boats drawing deep draft to land in addition to being able to give right of way to all passenger and freight boats at its dock. This may take some time, but in all probability eventually will be done.

I believe that with a dock owned by the city, built out from a point east of the Bear River, which is now owned by the city, that both freight and passenger traffic would be materially increased at this port, and I believe strongly that Petoskey Harbor is worthy of further attention by the United States. Any information you may desire further, if it is at all in my power, I shall be pleased to let you have.

Digitized by Google

I desire to thank you for your endeavor to obtain local information on the subject, and also for your courteous treatment of the officials of this city, and you may rest assured that we have only the welfare of the city at heart, and do not contemplate using money appropriated by Uncle Sam when we do not see need of it. Consequently your interpretation of the situation is one which I believe is logical and right. It certainly has my approval.

Sincerely, yours,

CHAS. J. GRAY,
Chairman Light Committee.

UNITED STATES ENGINEER,
Grand Rapids, Mich.

LETTER OF MAYOR OF CITY OF PETOSKEY.

PETOSKEY, MICH., *August 28, 1911.*

DEAR SIR: Replying to your favor of the 18th instant, relative to further extension of the Petoskey Breakwater.

The tonnage both in and out of Petoskey is light and in itself would not justify a large expenditure for harbor improvement. It was not seriously considered when the breakwater was first projected and can not be used to determine the necessity of further expenditure.

Petoskey is a watering place and has a great number of summer visitors. Many of these are landed from the large passenger steamers and thousands of them daily cross and recross the bay on the ferry boats and other smaller craft, and it is this human freight, if I may be allowed the expression, that we wish to protect, and for their protection was the pier first projected.

In my opinion the present structure fully provides for the conditions as now existing and I favor your idea of using the appropriation for necessary repairs and as a nucleus for a concrete superstructure when same becomes necessary.

Should other conditions obtain which would require a change or extension of the pier, such as different location of docks, etc., we will be pleased to call your attention to them.

Thanking you for the attention you have given the matter, I am,

Very truly, yours,

W. L. MCMANUS, JR., *Mayor.*

Lieut. Col. C. S. RICHÉ,
Corps of Engineers.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 455.

CHANNEL CONNECTING MILES AND TRED AVON RIVERS, MD.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF CHANNEL CONNECTING MILES RIVER AND TRED AVON RIVER NEAR ROYAL OAK, MD.

JANUARY 16, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 15, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 12th instant, together with copy of report from Col. T. L. Casey, Corps of Engineers, dated July 6, 1911, on preliminary examination of channel connecting Miles River and Tred Avon River near Royal Oak, Md., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 12, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated July 6, 1911, by Col. T. L. Casey, Corps of Engineers, on preliminary examination of channel connecting Miles River and Tred Avon River near Royal Oak, Md., called for by the river and harbor act approved February 27, 1911.

Digitized by Google

Interested parties are desirous of having these streams connected by the excavation of a channel 9 feet deep and 100 feet wide, with a view to shortening the distance from Choptank River points to Baltimore, and giving points on Miles River the advantage of steamboat transportation. The district officer states that the distance to be run by steamers via the proposed route would be practically the same as, and that the time would be greater than, by the present route, and that in his opinion the cost would be out of proportion to the commercial benefits to accrue, and therefore the locality is not worthy of improvement by the United States at the present time. The division engineer concurs in this opinion.

As required by law the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated August 21, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of "Channel connecting Miles River and Tred Avon River near Royal Oak, Md.," in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF CHANNEL CONNECTING MILES RIVER AND TRED AVON RIVER, MD.

United States Engineer Office,
Baltimore, Md., July 6, 1911.

Sir: In compliance with department letter of April 7, 1911, I have the honor to submit the following report upon preliminary examination of channel connecting Miles River and Tred Avon River near Royal Oak, Md., provided for in the river and harbor act of February 27, 1911.

There is now no connections of the waters of the Miles and Tred Avon Rivers excepting through Chesapeake Bay, and it is desired by those interested in the proposition to have them connected through fast land near Royal Oak. To further this end the residents of the locality have organized a "canal committee." An examination of the location of the proposed cuts was made in company with the vice chairman, secretary, and several members of the committee.

There is, as a matter of course, no existing commerce, nor is there any water power, land reclamation, or other scheme that could be considered in connection with any waterway improvement in this locality.

There are two routes under consideration for the proposed canal, one connecting Oak Creek and Plaindealing Creek, shown in green on the accompanying piece of United States Coast and Geodetic Survey

Digitized by Google

Chart No. 135[1]; the other connecting Tar Creek with Edge Creek and Edge Creek with Oak Creek, shown in red. The latter is the one selected for examination, for the reasons that it passes through Royal Oak, is the one desired by those interested in the improvement, and is the more logical of the two, as it would connect three bodies of water instead of two.

Those interested in this project claim that were a channel 9 feet deep by 100 feet wide opened between these waters, the steamboat route from Choptank River points to Baltimore would be shortened and points on the Miles River would have the advantage of steamboat transportation. As a matter of fact, the distance to be run by the steamers would be practically the same and the time greater than by the present route.

To produce a channel of the desired dimensions it would be necessary to cut through fast land for a distance of about seven-eighths of a mile. This land varies in elevation from 0 to 6 feet on the northerly line, from which a dwelling house would have to be removed, and from 0 to 9 feet on the southerly route. Two crossings of a county road would have to be made, necessitating the construction of drawbridges. The railroad bridge across Oak Creek would have to be rebuilt with a wider draw (the present one having about 17 feet clear opening). A considerable amount of dredging would have to be done in Tar, Edge, and Oak Creeks and Miles River. It is stated that wharf facilities would be supplied where needed, and that the property necessary for the canal would be ceded to the United States free of all charges.

A statement of the number and kind of vessels that would use the canal was unobtainable, but an estimate of prospective commerce may be gathered by statements made in the following letter from the secretary of the canal committee dated April 25, 1911:

LETTER OF CANAL COMMITTEE.

ROYAL OAK, MD., *April 25, 1911.*

MY DEAR SIR: Any estimate of commerce through a canal from Miles River to the Tred Avon at Royal Oak must of necessity be largely guesswork, as no such channel now exists.

The movement of local traffic would be quite extensive. Oysters, fish, fruits and vegetables for canning as well as for market, much lumber, and miscellaneous freights would naturally find this route, as it would save the long journey around Black Walnut Point on traffic originating on the Choptank and its tributaries destined to Baltimore. Of course the corresponding supplies in the opposite direction would go this way.

A chief feature of this project is that it would enable the steamers from Baltimore now plying on the Choptank to serve all Miles River points while en route to Easton, the Tred Avon, and the Choptank River. This would give ample shipping facilities to Miles River territory, a large region now practically without transportation, either rail or water; of course that refers to regular steamboat lines and not the occasional sail vessel.

The only point to suffer would be Tilghmans Island. It could be served as conveniently as now by some of the steamers plying to any of the lower bay ports.

No facts on which to base a definite estimate of tonnage are available. It is said that $5,000,000 worth of canned tomatoes per year are produced within 25 miles of Easton. The traffic of the entire Choptank River territory would follow this shorter route to the city.

Much of this trade is interstate commerce, notably, oysters, crabs, and crab meat, which are widely distributed among western cities via Baltimore. Much of it reaches Canadian points and thus comes under the head of foreign trade.

[1]Not printed.

Digitized by Google

Salt water and agricultural products, fertilizer, lumber, coal, grain, and general merchandise, together with the constantly growing commerce of several thriving towns and cities, would be borne on the waters of this canal. New manufacturing and canning enterprises now projected or being established will furnish a constantly increasing volume of trade.

An appreciable proportion of the proposed improvement could follow tributary waters of Broad Creek, thus avoiding much of the expense of the undertaking.

It is a matter of deep regret that more detailed and more definite information can not be supplied. But I realize the futility of offering figures based upon mere estimates the reliability of which it would be impossible to substantiate.

Kindly inform me when I can be of further service to you in this matter, and believe me, sir,

Very respectfully and truly, yours,

J. V. MOORE,
Secretary

Col. THOS. L. CASEY,
Corps of Engineers.

The cost of a canal such as outlined above would be out of all proportion to the commercial benefits to accrue. The real need of the locality is a channel of moderate width and slight depth, sufficient to accomodate small sailing vessels and motor boats. If made, it should be at the expense of the local interests rather than by the General Government.

For the reasons and facts above stated I am of the opinion that Miles and Tred Avon Rivers near Royal Oak, Md., are unworthy of improvement in the manner requested at the expense of the United States.

Respectfully submitted.

THOS. L. CASEY,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
EASTERN DIVISION,
New York City, July 7, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 21, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This preliminary examination has in view the construction of a "channel connecting Miles River and Tred Avon River, near Royal Oak, Md." The two streams mentioned empty into the eastern side of Chesapeake Bay, and are separated by a neck of land of varying width. Local interests are desirous of having a connecting channel excavated in the vicinity of the town of Royal Oak, where there are several small creeks which somewhat reduce the width of land separating navigable water. The route proposed runs via Tar Creek to Edge Creek, and from Edge Creek to Oak

Digitized by Google

Creek, as indicated on the accompanying section of C. & G. S. Chart No. 135. The route passes through Royal Oak and would afford connection with Broad Creek.

Those advocating this improvement claim that if a channel 9 feet deep and 100 feet wide were opened between these waters the steamboat route from Choptank River points to Baltimore would be shortened, and points on Miles River would have the advantage of steamboat transportation. The district officer states, however, that the distance to be run by the steamers would be practically the same and the time greater than by the present route. The amount of commerce that would follow the improved waterway can only be conjectured, none being practicable at present. While some commerce now transported by other channels might use the passage, it is not believed that it would create new waterborne commerce of any magnitude or confer other benefits which would justify the probable expenditure involved. After study of the facts presented, the board concurs with the district officer and division engineer in believing that this locality is not worthy of improvement by the United States at the present time.

No communications have been received from interested persons, who were invited to submit their views to the board, nor has any request been received for a hearing on the subject. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be so coordinated with the work suggested as to render the improvement advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 456.

NEWPORT NEWS HARBOR, VA., AND ADJACENT WATERS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF HARBOR AT NEWPORT NEWS, VA., AND WATERS NEAR, IN, AND ABOUT THE CITY OF NEWPORT NEWS, WITH A VIEW TO SECURING INCREASED ANCHORAGE AREA FOR SMALL CRAFT.

JANUARY 16, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 15, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 12th instant, together with copy of report from Lieut. Col. M. M. Patrick, Corps of Engineers, dated June 10, 1911, on preliminary examination of "Harbor at Newport News, Va., and waters near, in, and about the city of Newport News, with a view to securing increased anchorage area for small craft," made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 12, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated June 10, 1911, by Lieut. Col. M. M. Patrick, Corps of Engineers, on preliminary examination of "Harbor at Newport News, Va., and waters near, in, and about the city of Newport

Digitized by Google

News, with a view to securing increased anchorage area for small craft," authorized by the river and harbor act approved February 27, 1911.

Newport News Harbor is a wide portion of the James River which lies along the city front of Newport News, has good holding ground and ample space for all shipping which enters the port, and is sufficiently sheltered to give ample protection to large anchored vessels. At times wave action is too heavy for small craft engaged in local traffic, and interested parties desire the construction of a sheltered baain where such boats can safely lie at anchor or at wharves. The district officer describes the localities where such sheltered harbor might be made, but in view of the small amount of present and reasonably prospective shipping of this class, the existing facilities, and the large cost of proposed work, he concludes that the improvement desired is not worthy of being undertaken by the United States. The division engineer concurs in this opinion.

As required by law the report was referred to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated August 1, 1911, concurring in the views of the district officer and division engineer. No communications were received in response to the notices of this unfavorable report.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of harbor at Newport News, Va., and waters near, in, and about the city of Newport News, with a view to securing increased anchorage area for small craft, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF NEWPORT NEWS HARBOR, VA.

Engineer Office, United States Army,
Norfolk, Va., June 10, 1911.

Sir: In compliance with the directions contained in letter, Office of the Chief of Engineers, 7th of April, 1911, I have the honor to submit the following report ordered by the last river and harbor act upon harbor at Newport News, Va., with a view to securing increased anchorage area for small craft.

The city of Newport News lies on the left bank of the James River a short distance above its mouth in Hampton Roads. The principal portion of this city is situated on the high ground about a mile from Newport News Point and extends for some distance up and down the James River with suburbs toward the northeast, which lie a little back from the waters of Hampton Roads.

What may with propriety be called the harbor at Newport News is that portion of the James River which lies along the city front; here the high ground comes down close to the river bank while deep

Digitized by Google

water in the river is close to the shore line; this shore line of the James River runs approximately northwest and southeast, and along it has taken place the greatest commercial development. There have been built a number of piers and docks which provide for the commerce of this growing city. The coal piers of the Chesapeake & Ohio Railway, of which Newport News is the freight terminus, are located farthest downstream along the city front; about a mile above them are the shipyard piers, and all of these piers are built out to where the depth is about 35 feet and over. This harbor at Newport News has good holding ground and is sufficiently large to accommodate all shipping which enters this port, while it is sufficiently sheltered to give ample protection to all anchored vessels which are of any considerable size. The river at this point is quite wide and the lands on both sides of it are comparatively low, so that in severe storms the harbor becomes quite rough, and though large vessels can lie safely at anchor in any weather, there is no well-sheltered area in which smaller craft can ride out such storms. It is reported that quite a number of such small boats have been swamped at their moorings or have been injured by being driven against the piers or docks to which they were tied.

The shore line of Hampton Roads below Newport News Point runs approximately northeast and southwest, making about a right angle with the general direction of the shore line of James River along the city front. Inland for about a mile from the Hampton Roads shore line toward the city the land is low and swampy, while off this shore lie the Hampton Flats upon which the average depth is about 10 feet. Immediately along the shore the bottom slopes gradually and the 10-foot contour is at an average distance from the low water line of about one-fourth of a mile. Along this Hampton Roads water front there has been practically no commercial development. The above description is believed to cover "all the waters near and about the city of Newport News."

"In the city of Newport News" the only waters are those of two small and insignificant creeks, one Newport News Creek, which empties into Hampton Roads at Newport News Point and the other, Salters Creek, which enters Hampton Roads about 1¼ miles northeast of this point. Both of these creeks meander in tortuous courses through the lowlands bordering Hampton Roads; they are both tidal streams and their low water depths are in many places not over 2 or 3 feet, while at comparatively short distances from their mouths they both degenerate into mere ditches.

It is believed to be evident from the brief description above that in the harbor at Newport News and the waters about this city, there is already ample anchorage area for all craft, large or small, which may seek this port. As nearly as I can ascertain from parties who evinced interest in this proposed improvement, what they had in mind was to endeavor to secure somewhere near the city of Newport News, not so much an increased anchorage area but rather an inclosed and sheltered basin where small boats could take refuge in time of stress or where such craft could land and load their cargoes, the idea being to develop such traffic as might best be handled in such small vessels of which traffic there is now but little at Newport News, due to the character of its existing harbor and the lack of such sheltered area where small boats can lie safely in all weathers.

Digitized by Google

Along the harbor front of Newport News and in the waters of Hampton Roads there is no way of providing a safe and sheltered basin for small craft except by building an inclosed dock along the harbor front or by building breakwaters, properly located somewhere in the vicinity of the city in Hampton Roads.

Just off Newport News Point is the inner end of Newport News Bar, and between this end of the bar and the point there is a good channel of width and depth ample for small craft. Newport News Bar runs, approximately, east and west for about 1 mile, and the depth on its crest is about 5 feet. Between this bar and the shore there is a triangular area, containing about 400 acres, where the natural depth is about 9 feet at low water, and this anchorage area is well protected from storms from all directions except the northeast. If the needs of commerce were sufficient to make it worth while, there would be no great difficulty in building a breakwater which would shelter this area from the northeast and thus provide a very safe harbor of refuge for small vessels.

Another solution of the problem which has been advocated by some of the people in Newport News is the dredging of an entrance to and a basin within one or the other of the two small creeks mentioned above. The river and harbor act approved June 25, 1910, ordered a preliminary examination of Newport News Creek, and the report upon this examination was printed in House Document No. 5, Sixty-second Congress, first session. In this report it was held that Newport News Creek was not at present worthy of being improved by the United States. Subsequent examination and consideration have not caused this opinion to be altered.

Eliminating Newport News Creek, there remains "in the city of Newport News," only Salters Creek, within the mouth of which there might be excavated such a basin or harbor for small boats. This creek is crossed a very short distance above its mouth by the bridge of the street railway which connects Newport News with the town of Hampton, some 6 miles distant. It has been stated that there might be little or no trouble in securing an alteration of the route of this street railway so that it would cross Salters Creek higher up and give a greater length of this stream, which might be improved and into which boats could pass without having to go through the street railway bridge. Assuming that the location of the street railway crossing could be changed to a point farther upstream, there would be no great physical difficulty in dredging through the flats at the mouth of this creek and in making an inclosed basin in the creek itself which could serve as a harbor for small craft. At the mouth of this creek there is a bar on which the low-water depth is but about 1 foot, and it is rather probable that there would be some difficulty in maintaining any entrance channel which might be dredged into the creek. The land on both sides of this creek is owned by private parties down to at least the low-water line, involving the greater portion of the bed of the stream; it would be necessary to acquire considerable land in order that a basin of reasonable size might be excavated along the creek, and unless land bordering such a basin were also secured the private owners would control the terminal facilities and landing privileges. Furthermore, an anchorage area in Salters Creek would be at a considerable distance from the business part of the city, and it is doubted whether it would be much used if it were made.

Digitized by Google

An effort has been made to ascertain the amount of freight now carried to and from Newport News in small boats. In the custom-house at this port there are registered 147 small sailboats, which average about 12 tons gross each, and 49 small steam and gasoline boats, which average about 15 tons gross each. Newport News is not the home port of all these boats, but it is said that probably 90 per cent of them make this city a port of call. Nearly all small boats calling at Newport News make use of a pier belonging to the Old Dominion Land Co.; records show that during the last year the following boats received or discharged freight at this pier:

Schooners	129
Barges	53
Sloops	15
Steam and gasoline boats	38
Yachts	1
Total	236

The receipts and shipments were as follows:

Commodity.	Short tons.	Value.
Lumber	2,972	$22,293
Lathe	602	1,054
Shingles	990	1,472
Bricks	1,336	5,807
Coal	500	2,750
Cement	78	488
Wood	526	1,100
Tomatoes	46	5,700
Total	7,050	40,664

To near-by ports where there are natural sheltered areas considerable quantities of sea food and garden truck are carried in such small boats, whose return cargoes consist of coal, fertilizers, and general merchandise. If at Newport News there were the proper facilities, it is possible that similar traffic might be developed, but it is impossible to estimate with any reasonable accuracy the amount of such commerce which would seek Newport News if sheltered terminals were provided.

The amount of freight carried in small boats to and from Newport News at present is not great, and while this commerce is probably somewhat hampered by the local conditions in the harbor, there is little reason to believe that it would increase considerably even if better facilities were provided. Well-sheltered terminals might induce the development of a traffic in other commodities which would add to the business of this port, but it is impossible to state, even approximately, the probable amount of such new commerce. At Newport News there is no public dock, nor can it be learned that there is at present any water-front property owned by the city where such a dock could be built. A public dock of moderate size, with an inclosed basin where small boats could lie in safety, would probably care for all the present commerce, its normal increase, and for all new traffic which might be developed, and such a dock would also probably do as much toward the development of such new traffic as any other improvement which could be made.

Digitized by Google

After careful consideration, it is my opinion that the harbor at Newport News, Va., and waters near, in, and about the city of Newport News, are not at present worthy of being improved by the United States to secure "increased anchorage area for small craft."

At the city of Newport News there are at present excellent terminal facilities owned by private parties, and provision is made for the transfer of freight from rail to water and from water to rail; but, as stated above, there is no public dock owned by this municipality.

As the waters in and about Newport News are all tidal, no question of water-power development enter into any discussion of their improvement.

Respectfully submitted.

MASON M. PATRICK,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., June 14, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I agree with the district officer that this project is not worthy to be undertaken by the United States.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 1, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This harbor is deep and commodious and affords ample facilities for all the large vessels now using it or likely to do so in the near future. Owing to the low and sloping shores and the wide expanse of water there is at times considerable wave action, and it is difficult and inconvenient for small craft to lie at anchor or tie to the wharves. It appears that the improvement desired is some form of sheltered harbor where these vessels can lie with safety and discharge or take on cargo.

The amount of commerce to be affected is given in the table within. From this it will be seen that during the past year 236 vessels of the class affected, consisting of schooners, barges, yachts, etc., received or discharged cargo at this harbor, amounting to about 7,000 tons. This commerce is insignificant when considered in connection with the total commerce of the port, which amounts to more than 6,000,000 tons annually, and this may be taken as an indication of the minor character and small importance of the traffic carried on by the small vessels.

The district officer describes all localities where a harbor or basin suitable for the purpose desired might be located, and concludes for reasons given that the improvement is not worthy of being undertaken by the General Government, in which view the division engi-

Digitized by Google

neer concurs. Any form of harbor, whether by means of a dredged inland basin or an anchorage area outside protected by a breakwater, would, it is believed, involve a cost out of reasonable proportion to the benefits to be expected. Conditions here are not favorable for the establishment of such a harbor at moderate expense, and in view of this fact and that there does not appear to be a pressing need for such an improvement, the board concurs in the belief that it is not advisable for the United States to undertake the work.

No communications have been received by the board in response to the district officer's notification of his unfavorable report. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which have any material bearing upon the questions involved.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

H D—62-2—vol 25——11

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 457.

SALKEHATCHIE RIVER, S. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF SALKEHATCHIE RIVER, TO MORRIS CROSSING, S. C.

JANUARY 16, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 15, 1912.

SIR: I have the honor to transmit, herewith, a letter from the Chief of Engineers, United States Army, dated 12th instant, together with copy of report from Capt. E. M. Adams, Corps of Engineers, dated January 12, 1911, on preliminary examination of Salkehatchie River, to Morris Crossing, S. C., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 12, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated January 12, 1911, by Capt. E. M. Adams, Corps of Engineers, on preliminary examination called for by the river and harbor act approved June 25, 1910, of Salkehatchie River, to Morris Crossing, S. C.

It appears from the report of the district officer that nearly two-thirds of the 227 miles of river under consideration is of insufficient capacity for even canoe navigation, that the country tributary to this

Digitized by Google

stream is sparsely populated, with little prospect of any commerce except a moderate amount of timber, and that but little interest is manifested in the improvement of the river. The district office is of opinion that it is unworthy of improvement and the division engineer concurs in this opinion.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated February 13, 1911, concurring in the views of the district officer and division engineer, attention is invited.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress, I report that the improvement by the United States of Salkehatchie River to Morris Crossing, S. C., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF SALKEHATCHIE RIVER, S. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Charleston, S. C., January 12, 1911.

SIR: I have the honor to report upon preliminary examination of Salkehatchie River to Morris Crossing, S. C., as required by the act approved June 25, 1910:

PREVIOUS EXAMINATION AND IMPROVEMENT.

Salkehatchie River has previously been examined and reported upon, in 1880, by Bvt. Maj. Gen. Q. A. Gillmore, United States Army. The report is published in the Annual Report of the Chief of Engineers for 1881, page 1143.

Following the preliminary examination referred to, improvement of the river was undertaken under a project which contemplated the removal of sunken logs, snags, trees, and similar obstructions in such manner as to provide a clear channel for rafts and flat boats from a point 123 miles above the mouth, near Tobys Bluff, down to Hickory Hill, 46 miles above the mouth of the river; the total length under improvement to be 77 miles, estimated cost, $18,000. The amount called for by the project was provided in a series of appropriations as follows:

1882	$5,000
1884	3,000
1886	2,000
1888	3,000
1890	5,000

Digitized by Google

With these funds snagging operations were carried on from 1883 to 1895, resulting in a fairly clear channel sufficient for rafting. This improvement permitted the cutting and floating out of all accessible high-grade timber. In 1896 the improvement was discontinued, as the desired result had been attained, and further maintenance would have served no useful purpose. A balance of $2,159.27 was returned to the Treasury.

PRESENT EXAMINATION.

On August 10, 1910, circular letters were sent to all parties known or presumed to be interested. Very few replies were received, and these indicated paucity of interest, though two petitions of no particular import were circulated among the farmers and landowners of Hampton, Barnwell, and Colleton Counties and later submitted. No useful facts, figures, or data were presented.

Salkehatchie River is formed by the junction of several small streams in Barnwell County, S. C., and flows generally southeasterly through Barnwell, between Bamberg and Barnwell, between Colleton and Hampton, and between Colleton and Beaufort Counties to point of discharge into St. Helena Sound. Under the act the present examination was begun at Morris Crossing, near the town of Barnwell, 227 miles above the mouth of the river. Mr. W. O. Whitescarver, assistant engineer, with party, embarked at that point in canoes, going thence downstream to the salt-water section near the coast, occupying, by reason of the impassable nature of the route, the period November 18 to December 10, 1910, in making the trip. The river was at approximately low-water stage.

At Morris Crossing (mile 227), the Salkehatchie is a mere creek, very narrow and shallow. It is of the blackwater type, carrying very little sediment. From Morris Crossing, 17 miles downstream to Rays Bridge, the river continues as a small creek, running through a wide swamp. Many laterals leave and enter. The main stream is so obstructed by logs, snags, trees, and brush that count is impossible; widths vary from 8 feet to 35 feet. At Rays Bridge (mile 210) the swamp is about 1 mile wide, and is drained by the main stream and eight paralleling laterals. For the next 3 miles (miles 210 to 207) the river continues as a very narrow and tortuous creek, width varying from 8 feet to 40 feet; and is so blocked by jams of obstructions that the inspecting party had to cut their way through with axes, making only 3 miles per day. From mile 207 to mile 185 (Seaboard Railway trestle) the river is somewhat broader, varying from 30 to 60 feet, but is still a mere creek, tortuous, shallow, swift, and completely obstructed by jams of logs, snags, and trees too numerous to count. From mile 185 to mile 177 there actually is no river. The main stream divides into a network of rivulets running through the swamp; even these at times disappear into tangles of brush and grass.

In this section it was necessary for the party to cut their way. From mile 177 to mile 173 there is again a section in which laterals unite to form a fair-sized creek, though this is badly blocked by jams of obstructions, through which it was necessary to cut a way, the party advancing on one day only one-quarter of a mile. From mile 173 to mile 140 the river is once more a network of small swampy runs, alternating between creek-like character and infinite lateral

Digitized by Google

subdivisions, the creek and laterals being jammed by logs, snags, tree tops, and brush. From mile 140 to mile 134 (Hampton & Branchville Railway bridge) the river is somewhat more open, though still a mere creek, dividing and subdividing, spreading out over the swamp, and running through tangles of obstructions. From mile 134 to mile 124 the river consists of several small paralleling creeks, meandering through the swamps. At the lower end of this section there is another region of dispersion into many rivulets and blind lakes, there being no actual waterway. From mile 124 to mile 122 (Tobys Bluff Bridge) there is still no waterway; the swamp is cut up by many small, narrow creeks, all obstructed by jams. At Tobys Bluff the swamp is about 1 mile wide, and the river consists of 17 paralleling streamlets and some lakes. From mile 122 to mile 105 the river continues much as above, the largest streamlet being very crooked and shallow, badly obstructed by logs, snags, roots, and brush. From mile 105 to mile 80 the main stream is somewhat larger, though still no more than a creek. It is very narrow in many places, very tortuous, and obstructed by sand banks and shoals. In one stretch the main creek runs through and over an area of cypress roots and knees, through which the current is swift and dangerous, even for canoes. From mile 80 the main stream gradually widens, receiving the discharge of many small streams and lakes, and is somewhat less obstructed.

At mile 78 the main stream joins with the main stream of the Little Salkehatchie River, the confluence of the two branches providing a much greater volume of flow. From this point for 19 miles the river varies in width from 90 to 175 feet; in depth, from 4.8 to over 10 feet; with sandy bottom. The river retains tortuous trace, and though less obstructed than above, shows 64 logs, 115 snags, and 97 overhanging trees. At mile 59 (Atlantic Coast Line Railway bridge) the effect of lunar tides becomes distinctly perceptible. Here the river changes its character, and its name as well, being known as Combahee River from this point to the sea. This tidal section (mile 59 to the mouth) is much broader, deeper, and more open. Widths vary generally from 120 to 400 feet, and toward the mouth of the river to 600 feet; depths from 3.6 to over 10 feet. The river is tortuous in trace, but the bends are long and easy; the channel crosses from side to side. Sand bars are numerous, though depths on the bars are always sufficient for river navigation.

6. Summarizing the above: From Morris Crossing to the point of confluence with Little Salkehatchie, 149 miles, the Salkehatchie River is, in general, a mere network of rivulets running through a broad swamp valley. From the junction to Atlantic Coast Line Railway bridge, 19 miles, the river is a fair-sized stream, of fair width and depth, but tortuous and obstructed by snags, logs, and trees. From Atlantic Coast Line Railway bridge to the sea, 59 miles, the river is known as Combahee; is a tidal stream, tortuous, but broad and open, with good depths, and almost wholly unobstructed.

The region adjacent to the Salkehatchie and Combahee Valleys is sparsely settled and of agricultural character. There are no communities of any size on or near the river. The upper valley is heavily timbered, and while the best grades of timber have been cut out, there remains much which under present market conditions could, if accessible, be cut and sold.

Digitized by Google

As stated before, the people of the Salkehatchie Valley exhibit very little interest in the present examination or in the proposed improvement. The few who advocate improvement suggest that a waterway navigable for rafts and small steamers would benefit them, as they could then cut the available timber and float it out to the coast, ship out their farm products, and import their supplies by steamer. A more lively interest is found upon the part of those who desire clearing of the channel in order that run-off may be accelerated, thus improving drainage and making low-lying lands more nearly available for cultivation.

I find no indication that any commerce other than rafting could be developed. It can not be expected that the small communities of this sparsely settled country can organize or support a steamboat traffic. As for the rafting, improvement for this purpose alone seems to be a doubtful policy; it would certainly be expensive. And improvement for drainage can not be considered under this act.

RÉSUMÉ.

(*a*) From Morris Crossing to junction with Little Salkehatchie: Improvement for steamers is impracticable; for rafting, is practicable, but would be very costly, and is not justified.

(*b*) From the junction to Atlantic Coast Line bridge: Improvement for rafting and steamers is practicable, but would serve no very useful purpose.

(*c*) From Atlantic Coast Line bridge to the sea: No improvement is required.

As to special subjects:

(*a*) No water-power development can be coordinated with prospective improvement.

(*b*) Floods are infrequent and never severe. No measures for flood control may be considered.

(*c*) Terminal facilities: There are none. There need be none.

Salkehatchie River is unworthy of improvement by the United States.

Very respectfully,

E. M. ADAMS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., January 14, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I agree with the district officer that the Salkehatchie River is not worthy of improvement by the United States.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 13, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Summarizing the within report, it appears that the stretch of river under consideration covers a distance of about 227 miles, the upper 149 miles running through a swamp, being but a network of small

Digitized by Google

rivulets of insufficient capacity for navigation with a canoe. The next 19 miles is in better condition, but is tortuous and obstructed by snags, logs, and trees. The next 59 miles, reaching to the mouth, is tidal, and while tortuous is unobstructed and is navigable without improvement.

The country tributary is sparsely populated and there is little prospect of any commerce except a moderate amount of timber. Little interest is manifested in the improvement of this stream, as indicated within and from the fact that no communications have been received by the board in response to the district officer's notification of his unfavorable report.

Believing that little commerce would result from the improvement of this stream and that the cost would be largely in excess of resulting benefits, the board concurs in the opinion of the district officer and the division engineer that this locality is unworthy of improvement.

In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed as to render the improvement advisable in the interest of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 463.

CHIPOLA RIVER, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF CHIPOLA RIVER, FLA.

JANUARY 17, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 16, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 15th instant, together with copy of a report from Lieut. Col. G. D. Fitch, Corps of Engineers, dated May 18, 1911, of a preliminary examination of Chipola River, Fla., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 15, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated May 18, 1911, by Lieut. Col. G. D. Fitch, Corps of Engineers, on preliminary examination of Chipola River, Fla., called for by the river and harbor act approved June 25, 1910.

Chipola River is now being improved by the United States under a project which provides for a low-water channel 60 feet wide and 5 feet deep up to the foot of Dead Lakes, and 3 feet deep thence to Marianna, which is 65 miles above Dead Lakes. The district officer is of opinion that the river is not worthy of improvement above Look and Tremble Shoal, 45 miles above Dead Lakes; and below this point

Digitized by Google

it is worthy of improvement only so far as contemplaed by the existing project.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose report herewith, dated August 21, 1911, attention is invited. The board concurs in the opinion expressed by the district officer.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors; and therefore, in carrying out the instructions of Congress, I report that the improvement of Chipola River, Fla., above Look and Tremble Shoal is not advisable at the present time; and below that point it is worthy of improvement only so far as contemplated by the existing project.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF CHIPOLA RIVER, FLA.

UNITED STATES ENGINEER OFFICE,
Montgomery, Ala., May 18, 1911.

SIR: In compliance with department letter of August 4, 1910, I have the honor to submit the following report upon a preliminary examination of Chipola River, Fla., provided for by act of Congress of June 25, 1910:

Congress, by an act of June 14, 1880, authorized a preliminary examination of Chipola River, Fla. This examination was made by Capt. A. N. Damrell, Corps of Engineers, whose report is printed in Annual Report of the Chief of Engineers for 1881, page 1304.

Congress, by an act of August 11, 1888, authorized a preliminary examination of Chipola River, Fla., from its mouth to Marianna. This examination was made by Capt. Philip M. Price, Corps of Engineers, whose report is printed in Annual Report of the Chief of Engineers for 1889, page 1416. Capt. Price gave the estimated cost of clearing out a low-water channel of 3 feet depth and 60 feet width from Marianna to the foot of the Dead Lakes as $41,000, exclusive of the cost of the necessary plant, but did not consider this portion of the river worthy of improvement. He recommended, however, that a channel 60 feet wide and 5 feet deep be cleared through the cut-off, Lee Slough, and the Lower Chipola River, at an estimated cost of $7,500. By act of September 19, 1890, Congress adopted Capt. Price's recommendation.

Congress by act of June 3, 1896, authorized a preliminary examination of the Chipola River, Fla., from Marianna to its connection with the Apalachicola River. This examination was by Maj. F. A. Mahan, Corps of Engineers, whose report is printed in Annual Report of the Chief of Engineers for 1898, page 1423. Maj. Mahan reported the river from Marianna to the cut-off as not worthy of improvement.

By act of March 3, 1899, Congress adopted a project for clearing out a low-water channel of 3 feet depth and 60 feet width from Marianna to the foot of the Dead Lakes, estimated to cost $41,000 exclusive of the cost of the necessary plant. This is the present project.

Digitized by Google

From Marianna the Chipola River flows southward for about 65 miles to the head of the Dead Lakes, a wide sheet of water emptying into the cut-off, which flows from the Apalachicola River; below this point it is known as the Lower Chipola River and has an available depth of 5 feet until it again joins the Apalachicola River. The Upper Chipola River is a very small and crooked stream, greatly obstructed by rock shoals, snags, and overhanging trees, as well as by three bridges with headways 17, 16, and 15 feet, respectively, above low water. It has a general low-water depth of 5 feet and a width ranging from 60 to 200 feet. At Look and Tremble Shoal, about 45 miles above the Dead Lakes, there is a fall of 5 feet in 40 over rock bottom. Below this shoal the river is in fair condition, with a maximum depth at low water of 2 feet over the shoalest part. The variation of the water level is 0 to 14 feet. The actual head of navigation at ordinary low water is Braxton's Landing, 40 miles above the foot of the Dead Lakes.

Under the project adopted by Congress in 1899 snags, logs, and overhanging trees were removed and a channel blasted through the rock reefs from Marianna to Look and Tremble Shoal, and this part of the river is now in satisfactory condition for rafting.

Very little benefit has been derived from the expenditure above Look and Tremble Shoal, and any further improvement would require the construction of at least one lock and dam and very expensive channel work over rock shoals. My predecessors have, in every annual report from 1901 to 1910, inclusive, recommended that no further work be done above Look and Tremble Shoal. The snagging done below this shoal has, however, been of much benefit.

This office has always found it impracticable to give the commercial statistics for the Chipola River separately, as they are so combined with those of the Flint, Chattahoochee, and Apalachicola Rivers. Effort was made to accomplish something in this direction by a circular letter of inquiry sent by Capt. H. B. Ferguson, Corps of Engineers, to all persons supposed to be interested, and further inquiries have also been made since. A copy of every reply received is forwarded herewith. The information is unsatisfactory, but in any case the commerce is small. Marianna has a population of 1,411, and there are 9 small villages near the stream with a total population, as given by Bradstreet, of 133. There is a railroad from Marianna to Blountstown which handles practically all the business and would probably continue to do so even if the river were improved to Marianna.

Questions of terminal and transfer facilities, water power, flood control, and land reclamation are not involved.

Further information is given in the report of Mr. J. W. Singleton, superintendent, to which attention is respectfully invited.

In my opinion Chipola River is not worthy of improvement by the United States above Look and Tremble Shoal, but is worthy of improvement below that point by snagging and river regulation as authorized under the existing project. No survey is required.

Very respectfully,

G. D. FITCH,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the division engineer.)

Digitized by Google

[First indorsement.]

OFFICE DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., May 22, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district engineer that the locality is not worthy of improvement by the United States at this time.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 21, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The present project, adopted by the act of March 3, 1909, provides for a low-water channel 3 feet deep and 60 feet wide from Marianna to the foot of the Dead Lakes, at an estimated cost of $41,000. Under this project there had been expended to June 30, 1910, $20,000, and the river was fairly well cleared of snags, logs, etc., and placed in a satisfactory condition for rafting. From Marianna to the head of the Dead Lakes, about 65 miles, the river is crooked, and naturally obstructed by rock shoals, snags, overhanging trees, and to some extent by three bridges. At Look and Tremble Shoal, about 45 miles above the lakes, there is a fall of 5 feet in 40 feet, which can not be effectually overcome except by the construction of a lock and dam at a cost which clearly appears unjustifiable.

The commerce of the stream is not definitely known, but it is small. It is reported that the work done above the falls has resulted in so little benefit that each local officer since 1901 has recommended that no further work be done above Look and Tremble Shoal. The work accomplished below this shoal in the way of removal of obstructions, etc., has been of much benefit.

After reviewing present conditions, the district officer expresses the opinion that the river is worthy of continuing the improvement below Look and Tremble Shoal, as provided under the existing project, but that it is not worthy of improvement above this shoal. In this view the division engineer concurs.

Several communications have been received by the board as a result of the district officer's notification of his unfavorable report, and given due consideration. It appears from early correspondence that the operation of a steamboat line on the Chipola River by the Callahan Line was anticipated, and this fact was considered a material point in favor of additional improvement. In a later communication from Mr. Callahan, president and manager of the line, however, it is stated that "I have about come to the conclusion that it would not be practicable to make this river navigable above Look and Tremble Shoal," indicating that the boat will not be placed in operation on this section of river.

From all information now available the board has reached a conclusion in accordance with the views expressed by the district officer and division engineer that Chipola River is not worthy of improvement by the General Government above Look and Tremble Shoal,

Digitized by Google

but is worthy of improvement below this shoal by snagging and river regulation, as authorized under the existing project. The board reports, in compliance with law, that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement under consideration.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF MR. J. W. SINGLETON.

UNITED STATES ENGINEER OFFICE,
Columbus, Ga., May 10, 1911.

COLONEL: Replying to your letter of April 21, 1911, in reference to report on Upper Chipola River, Fla.

The correspondence sent me covers about all the interested parties. I have written to Mr. J. W. Callahan, president and general manager of the Callahan Line of steamers, who operates a small boat in the Upper Chipola River which makes connection with his regular line of boats at the foot of the Dead Lakes; his reply is attached to the correspondence. I also wrote to Mr. A. S. Mohr, of Apalachicola, Fla., superintendent of the Cypress Lumber Mill, one of the largest mills in that section; his reply is also attached. I know of no one else to write to who is interested.

The Upper Chipola River is a very small and crooked stream. From the mouth of the river, that is, the foot of the Dead Lakes, to Look and Tremble Shoals can be made navigable for very small boats at a small cost * * *, in addition to the present allotment. At Look and Tremble Shoals there is a rock reef with about 5 feet fall in 40 feet. This would require a lock. Above this point there are numerous rock shoals, and as you approach Marianna the river becomes very narrow and crooked; at places it is only about 50 feet wide at low water. The section of the country adjacent to the river is fairly good farming land, the best lying above Look and Tremble Shoals. The whole country was heavily timbered with principally pine and cypress. I think the greater part of the timber has been cut and rafted to Apalachicola. However, there is quite a lot of timber left. Nearly all of this timber has or is being turpentined, and in a few years the timber and naval store industries on the river will practically have been exhausted, and the only real benefit derived from improving the river will be to the farming industry. There is a railroad from Marianna to Blountstown going through this section. They are handling practically all the naval stores and merchandise business and will probably continue to do so even if the river was improved to Marianna. If improved, it will undoubtedly increase the commerce on the Apalachicola system and be a feeder to the Apalachicola River and St. Andrews Bay Canal, but the cost, in my opinion, will be too heavy for the commerce in sight. If the river is put in shape from Look and Tremble Shoals to the foot of the Dead Lakes, I think it would be well and proper, but from Look and Tremble Shoals to Marianna I think the cost prohibitive in proportion to the prospective commerce. There are 9 small villages near the stream. The total population as given for the 9 villages by Bradstreet is 133. Marianna is given at 1,411. Of course there is a greater population than this, counting all the people scattered through the country. I doubt if it would be more than doubled. I am compelled to say, considering all the facts and interests, that, in my judgment, the stream above Look and Tremble Shoals is not worthy of improvement by the United States, and that this stream is worthy of improvement, to the amount stated above, below Look and Tremble Shoals. All correspondence is herewith attached.

Very respectfully, your obedient servant,

J. W. SINGLETON, *Superintendent.*

Lieut. Col. GRAHAM D. FITCH,
Corps of Engineers.

LETTER OF MR. J. W. CALLAHAN.

CALLAHAN LINE,
Bainbridge, Ga., May 1, 1911.

DEAR SIR: Replying to yours of the 25th ultimo, I am sorry, but I am afraid that I can not give you all the information you ask for regarding Chipola River.

We operate up as high as Steel Bridge twice a week and sometimes go up as far as Look and Tremble Shoals, but not every trip.

Digitized by Google

There are several stills on this river, but I do not know just how many. I don't think the turpentine is anything like worked up yet, as the business gets larger every year.

I do not think the Marianna & Blountstown Railway will affect the business much, if any, above Look and Tremble Shoals.

I am not in position right now to give you the amount of tonnage we handle on the Chipola River, but will get this information for you and send to you as early as possible. However, I believe the tonnage would increase very much if this river was navigable up as high as Marianna, Fla., and I believe it would be beneficial to that section of the country to operate up that high. The country adjoining Chipola River is a very rich agricultural country and is growing very fast. Personally, I would like to see that part of the country developed, and if the river was navigable up as far as Marianna I believe it will be done.

Will let you have the monthly tonnage at an early date.

Yours, very truly,

J. W. CALLAHAN,
President and General Manager.

Mr. J. W. SINGLETON, *Superintendent,*
United States Engineers, Columbus, Ga.

LETTER OF THE SUPERINTENDENT OF THE CYPRESS LUMBER CO.

APALACHICOLA, FLA., *May 2, 1911.*

DEAR SIR: Your favor of April 25 was duly received, and in reply would say that we do not own any land above Look and Tremble Shoals.

In answer to your question as to how much available timber there is above the Look and Tremble Shoals, would say that we have absolutely no way of giving you this information, as we have never had this part of the State estimated. Owing to the uncertainty of bringing timber over the Look and Tremble Shoals we have refrained from buying timber up there.

I think Mr. Thos. Howard, of Port St. Joe, or Mr. A. Buford, of the same place, are more or less familiar with the territory referred to and can perhaps give the desired information, and, if you wish me to, I will refer your letter to these parties.

Regretting that I can not give you the information you desire, I remain,

Yours, very truly,

A. S. MOHR, *Superintendent.*

Capt. J. W. SINGLETON,
United States Engineer Office, Columbus, Ga.

LETTER OF THE PRESIDENT OF THE MILTON LAND INVESTMENT CO.

MARIANNA, FLA., *September 2, 1911.*

DEAR SIR: Your letter of the 19th to Hon. D. H. Mays has been referred to me.

The request for a survey of the Chipola River was made by me through Mr. Mays I do not know exactly how the survey was granted, and would ask that you be so kind as to send me a copy of that portion of the act requiring the examination of the Chipola River. If there is any other information that I can give you about this river will be glad to do so.

Some years ago there was some work done on the Upper Chipola through the Montgomery office at my instance. After this was done I did not ask for any more, as I thought that the commerce would not justify it, and I also found that it might be necessary to put in a lock and dam, but of this I am not certain, therefore requested another survey through Mr. Mays. Since the former work on the river, I think that it should now be improved in order that we may obtain the benefit of the short canal connecting the lower part of this river or the Apalachicola River, with the arm of St. Andrews Bay.

Yours, truly,

W. H. MILTON, *President.*

Capt. H. B. FERGUSON,
Corps of Engineers.

LETTER OF MR. E. HENDERSON.

BRISTOL, FLA., *September 1, 1910.*

DEAR SIR: Your letter to me at Altha was forwarded here, and in reply beg to say that there is quite a large amount of commerce handled throughout the Red Level district which would go via Chipola River should the river get it, but before now

Digitized by Google

there has been no certainty about shipping on the river for several reasons. One side of people are fighting it on account of personal interest at other places, some fighting it for "money," and some on account of being led to believe that taxes would be very much higher, and several minor reasons.

On the other hand, all the people who wish to see advancement want the river transportation, except a few whose interest at other points would hurt. The Macon & Birmingham Railroad runs through now, and guess it will get the larger per cent of commerce from the Red Level section, but some of it would go via river, and then both sides of river ought to give it good business.

As for myself, I want to see Chipola River opened up as good as possible, and I believe it would get first-class business and would hold rate cheaper via the railroad. I am not in business at Altha no longer, but still own property there.

If you want figures of commerce, I refer you to Liddon & Turaville, Altha, Fla.; W. A. Gibson, Altha, Fla.; postmaster, Carr, Fla.

Yours, truly,

E. HENDERSON.

Capt. H. B. FERGUSON,
Corps of Engineers.

LETTER OF MR. H. B. GASKIN.

BLOUNTSTOWN, FLA., *August 27, 1910.*

DEAR SIR: I beg to acknowledge yours of the 26th instant requesting information regarding the amount, value, and character of future commerce that would result from improvement of the Chipola River, and making special request in regard to information concerning the commerce in which I am interested.

Replying to your inquiry, I beg to state that the shipments in which I am interested originate at Buckhorn, on the Dead Lakes, about 6 miles north of Wewahitchka, and our product there will probably hold its own for the next one or two years, and will gradually fall off. The naval-stores industry, which is the chief industry along the Chipola River at present, is gradually falling off from the fact that most all of the accessible timber is being utilized. The German-American Lumber Co. of St. Andrews Bay is tapping most of the country south of the basis parallel and west of Chipola River to St. Andrews Bay and vicinity with logging roads, which are handling the bulk of the spirits and rosin together with the mill timber.

The agricultural industry is making no progress whatever in that territory, or if any, it is so little that it is not appreciable. There is now in operation a railroad from Blountstown to Marianna which is handling all of the product of various kinds between Blountstown and Marianna on the east side of the Chipola River. All of these facts taken together indicate, to my mind, that the commerce on the Chipola River will soon be a thing of the past. North of the steel bridge there is a small turpentine location that still ships down the Chipola and, so far as I am advised, this is practically all.

If there is any further information that I can give you, I will be glad to do so.

Yours, very truly,

H. B. GASKIN.

Capt. H. B. FERGUSON,
Corps of Engineers.

LETTER OF MR. J. M. CALHOUN.

MARIANNA, FLA., *September 6, 1910.*

DEAR SIR: Replying to yours of the 26th ultimo in reference to the Chipola River of this section, beg leave to say that it is my opinion that the Government could by some reasonable expense put the river in navigable order from Clarksville to Marianna, and if it was made navigable that additional distance would add largely to the commercial usefulness of the stream as a public highway. On each side of the stream there is a great deal of business being carried on in the way of lumbering, naval stores manufacturing and various kinds of farming, especially that of producing cotton that is exclusively an export product which makes it an imperative necessity to have the benefit of transportation in order to put it to market.

The country along the line of this river is settled up with substantial citizens almost from one end to the other. Besides, if the new canal is cut through that Congress has already provided funds to open up at or near the mouth of this river to St. Andrews Bay, this project alone will necessarily multiply the usefulness of the river for transportation purposes through the canal to this point, because we will then have direct inland waterways from here to the Gulf of Mexico.

Digitized by Google

I am confident that the work would be a great benefit to people along the line from which it is planned. I heartily recommend the project as a business enterprise and verily believe that the profits to the country will pay largely on the nominal cost of the improvements.

Very truly, yours, J. M. CALHOUN.

Capt. H. B. FERGUSON,
Corps of Engineers.

LETTER OF THE PRESIDENT OF THE MILTON LAND & INVESTMENT CO.

MARIANNA, FLA., *September 7, 1910.*

DEAR SIR: Your favor of the 26th ultimo received.

I am interested in the steamer *Calhoun*, which plies the Chipola River as high up as Look and Tremble Falls. There is now considerable commerce on that part of the river; enough to keep the steamer busy at all seasons. The upper part of Chipola River is now used only for the rafting of logs to Apalachicola, and the only navigation on that is by three or four small gasoline launches. There is considerable naval stores shipped down the river; and correspondingly there is brought up the river property to the value of about one million and a half dollars.

Very little work, in my judgment, would be required to make the river navigable to Marianna. There are several shoals between Marianna and Look and Tremble, which now prevent its navigation by steamers; at a comparatively slight cost these shoals could be partially filled, so as to confine the water to a narrower channel, and there would be at all seasons ample water to furnish navigation. Individually, I would ship 1,000 bales of cotton this season down the Chipola River with the slight improvement necessary. The future commerce of this river would be very great when these slight improvements are made. The lower end of this river will be connected with the port of St. Andrews Bay by a canal, and when this is completed there will probably be shipped down the river 20,000 bales of cotton and other freights in proportion.

If you desire more detailed information let me know and I will get up, as well as I can, a list of the shippers on Chipola River and have them to let you know the exact amount of shipments made by each one.

Yours, truly,

W. H. MILTON, *President.*

Mr. G. C. SCHERER,
Chief Clerk, United States Engineer Office,
Montgomery, Ala.

LETTER OF MR. J. W. BRAXTON.

MARIANNA, FLA., *September 12, 1910.*

DEAR SIR: Replying to your favor of August 26, for report as to value of present commerce on Chipola River, received.

I beg to submit the following:

The value of naval stores shipped out via Chipola River in one year, $150,000.

Merchandise of various kinds shipped in, $250,000.

Timber shipped out, handled in round logs, approximately 20,000,000 feet; total, $250,000.

This includes the commerce up to Look and Tremble Falls, approximately. In my opinion, the further improvement of the river as high as Marianna, Fla., would practically double the commerce. The improvement of this river would also affect freight rates on the large volume of merchandise, in addition to what would be shipped over the river.

Yours, truly, J. W. BRAXTON,
President of Chipola Transportation Co.

P. S.—The above does not include anything on the lakes.

Capt. H. B. FERGUSON,
Corps of Engineers.

Digitized by Google

LETTER OF MR. JOHN CLARK.

CLARKSVILLE, FLA., *September 15, 1910.*

DEAR SIR: Yours of September 12 instant to hand.

In reply, I do not handle naval stores, but my traffic on the Chipola River per annum will amount to about $7,000. Clarksville will amount to $75,000 or $100,000.

Yours, truly,

JOHN CLARK.

Mr. W. H. MILTON, *Marianna, Fla.*

LETTER OF MESSRS. JENNINGS & VARNADORE.

KINARD, FLA., *September 16, 1910.*

DEAR SIR: I am in receipt of your letter of 12th regarding the Chipola River, and in answer will say we shipped out something like $30,000 worth of naval stores each year and we have something like $24,000 come to us every year.

Hoping this information will be satisfactory, I remain, as ever,

Yours, truly,

JENNINGS & VARNADORE,
By C. V. VARNADORE.

Mr. W. H. MILTON, *Marianna, Fla.*

LETTER OF MR. THOMAS SPENCER.

WEWAHITCHKA, FLA., *September 17, 1910.*

DEAR SIR: I have just been able to get the freight sheets of commerce on Chipola River from the steamboat captain. He sent me the sheets for the month of August, and said that was an average per month for six months of the year; the other six months was about one-half that amount per month.

I will give you the commerce as I took it from the freight sheets, as this is the best I can do.

Hoping this will be satisfactory, I will close,

Respectfully,

THOMAS SPENCER.

Capt. H. B. FERGUSON,
Corps of Engineers.

Commerce for the month of August.

328 barrels spirits	per barrel	$30.00
1,177 barrels rosin	do	8.00
20,000 feet lumber	per M	16.00
48,000 shingles	do	3.75
500 cases canned goods, etc.		
160 sacks corn	per sack	2.10
120 sacks bran	do	1.40
125 sacks oats	do	3.75
65 sacks shorts	do	1.60
66 sacks dairy feed	do	1.60
6 sacks onions	do	4.00
90 sacks cottonseed meal	do	1.60
274 sacks flour	do	1.00
239 sacks corn meal	do	1.10
5 tons hay	per ton	20.00
35 50-pound tubs lard	per tub	7.50
28 boxes meat (300 pounds per box)	per box	45.00
75 caddies tobacco. "Don't know price."		
13 barrels kerosene oil	per barrel	6.00
50 empty spirit barrels	do	1.25
10 sacks salt	per sack	1.00
21 sacks rice (100 pounds per sack)	do	5.00
11 barrels sugar (300 pounds per barrel)	per barrel	18.00
14 sacks coffee (160 pounds per sack)	per sack	11.80
7 barrels flour	per barrel	7.00
9 rolls cotton batting (100 pounds)	per roll	15.00
11 rolls hoop iron. "Do not know price."		

Digitized by Google

6 sacks Irish potatoes	per sack	$5 00
5 sacks beans	do	4 00
5 sacks peas	do	4.00
4 barrels lime	per barrel	1.10
4 barrels glue. "Don't know price."		
13 cases dry goods.		
5 cases shoes.		
5 tons ice	per ton	10.00
4,725 passengers.		
25 rafts timber, 75,000 to 100,000 feet to the raft, price according to size of logs	per M feet	8 00 10 00 12.00

In regard to future commerce, population is increasing along the river.

Respectfully,

THOMAS SPENCER

LETTER OF MESSRS. FAULK & ROGERS.

CLARKSVILLE, FLA., *September 17, 1910.*

DEAR SIR: In reply say the amount of business done by this naval store place will amount to $15,000 per year, and we expect to increase it $10,000 next year.

With best wishes,

FAULK & ROGERS.

Mr. W. H. MILTON,
Marianna, Fla.

LETTER OF THE PRESIDENT OF THE MILTON LAND & INVESTMENT CO.

MARIANNA, FLA., *June 2, 1911.*

DEAR SIR: Your favor of the 29th ultimo, in reference to the unfavorable report on the subject of the upper Chipola River, Fla., received.

The engineer who examined the Chipola River and made an unfavorable report did not make such an examination as was desired and contemplated under the act. We who were interested in the Chipola River desired that this inspection be made with a view to determining the cost of lock and dam at Look and Tremble Shoals.

In 1899, according to my recollection, or 1898, quite a number of snags, logs, and overhanging trees were removed from the upper Chipola River under my direction and on a $5,000 appropriation made at my request, and at that time I carried between 800 and 1,000 bales of cotton down the river and over the shoals; and this work demonstrated that the river above Look and Tremble Shoals could be made navigable for commercial purposes, and that the principal difficulty was the falls at Look and Tremble. In ordinary high water there is no fall at this place, but at low water there is a fall of about 5 feet in 40 feet. Even at this stage of water there is no difficulty in a barge going down the shoals loaded with cotton and other commodities, but it would be impracticable for a steamer to come up the river over the falls, for the reason that it would be such a slow operation that it would strain the timbers in a boat; but there is no difficulty in bringing upstream a barge built for that purpose, as I operated one on this river for an entire season. After operating the river for that season differences were made in freight rates on cotton which did not make it advisable to carry cotton down the Chipola River. And since then conditions have changed and a cotton compress will shortly be built and put in operation at Apalachicola; then cotton tributary to the Flint, Chattahoochee, Apalachicola, and Chipola Rivers could be carried down these streams, compressed at Apalachicola for export or coastwise shipping from St. Josephs, there being a railroad from St. Josephs to Apalachicola Bay, and this cotton would command a lower rate by that route than any other route that could be given us.

The Callahan Line of steamers now contemplate putting two barges on the upper Chipola River; these barges would be operated by power to Look and Tremble Falls and there cotton could be transferred to river steamers, or barges could go over the falls loaded and carry it on to Apalachicola, and drop back up the river and over the falls empty, or practically empty, for another shipment of cotton.

Since 1899, the last time work was done above the falls, there has accumulated a number of snags, deadhead logs, and overhanging trees; if these were removed it would be practical to carry our merchandise down the river. We have had an appropriation made for this purpose (please see the last appropriation bill), and this appropriation

Digitized by Google

we would like to have expended in clearing the upper Chipola River of logs, snags, and overhanging trees.

The number of shoals mentioned in the unfavorable report by the engineer above Look and Tremble would not be very expensive channel work, because where these rock shoals occur the banks of the river could be readily built in and the channel made more narrow and thus deepened. This river practically is rock bottom and banks all of the way to Look and Tremble falls, and the work done on it would be permanent; and where the river bank was built in so as to narrow and deepen the channel, such work would stand for a long time, and the channel would stay deep, as there are no shifting sand bars in the river; and with comparatively little work the river could be made permanently navigable from Marianna to Apalachicola River. But transfers of freight would necessarily have to be made at low water at Look and Tremble, unless we could procure a sufficient appropriation for a lock and dam at that place; and this survey was authorized for the purpose of procuring an estimate on the cost of such a lock and dam. As I was instrumental in obtaining an appropriation for the river, and obtaining authority for a survey, I naturally supposed that when the engineer came to do the work that I would see him; but knew nothing of his work being done until I was notified of his having made an unfavorable report.

If we can secure the removal of the snags, logs, and overhanging trees from the Chipola River, and have some work done on narrowing the channel of the river at the shoals, our shipments down this river every winter would amount to above 8,000 bales of cotton. But there will naturally be no commerce on the river until the river can be put in proper shape for navigation. I see no necessity for this unfavorable report being placed on file, because the officer making the survey did not survey it for the purposes and with the improvements in view which we desired.

Yours, truly,

W. H. MILTON, *President.*

Col. W. T. ROSSELL,
Corps of Engineers.

LETTER OF THE PRESIDENT OF THE MILTON LAND & INVESTMENT CO.

MARIANNA, FLA., *June 9, 1911.*

DEAR SIR: Replying further to your letter of May 29.

I inclose you herewith a letter from J. W. Callahan, president of the Callahan Line of steamers, which you will please attach to my former letter, and you will note that this bears out what I wrote you, that we really need the improvements on the river at this time for the purpose of navigating the Chipola River with boats that have been and are now being built for this trade.

Yours, truly,

W. H. MILTON, *President.*

Col. WM. T. ROSSELL,
Corps of Engineers.

LETTER OF THE PRESIDENT AND GENERAL MANAGER OF THE CALLAHAN LINE.

BAINBRIDGE, GA., *June 5, 1911.*

DEAR SIR: Possibly you have read of the adverse report from Board of Engineers regarding work on upper Chipola River between Look and Tremble Falls and Marianna.

This is a very great disappointment to me and it certainly will cripple my undertakings on the Chipola River, especially above Look and Tremble Falls.

I have just completed and put in operation on the Chipola River a nice little steamer, name *Chipola*, and a barge with it for the purpose of handling the cotton from that river to Apalachicola to be compressed and exported from there, as there is now under construction at Apalachicola, Fla., a large compress plant.

My intention was to build another boat and barge to be operated on Chipola River, up as far as Marianna, just as soon as I could be assured that a little work would be done on this river to put it in navigable condition, but the adverse report makes it useless for me to try to do any further.

It would take but very little work to put Chipola River in navigable condition up as far as Marianna, and it certainly would help develop that section of the country very much, as it has the making of a very fine agricultural country.

I have just returned from a trip on Chipola River, and that section of the country impressed me very much as being extra-fine farming country, and, as stated above, with a little work on this river it will certainly help develop this country very much.

Digitized by Google

I think it a great mistake to not work upper Chipola River, and if there is any way possible I will appreciate it if you will get the engineers to reopen this matter and let us have a hearing.

Yours, very truly,

J. W. CALLAHAN,
President and General Manager.

Mr. W. H. MILTON, *Marianna, Fla.*

LETTER OF LIEUT. COL. G. D. FITCH, CORPS OF ENGINEERS.

MONTGOMERY, ALA., *July 13, 1911*

SIR: Congress by act approved June 25, 1910, provided for a preliminary examination of Chipola River, Fla.

Your various replies to the circular letter sent you requesting you to submit any information you might desire on the subject were transmitted with my report. No survey has been made or authorized.

In view of your letter of June 2, 1911, to Col. Rossell, I am requested to confer with you further. You are therefore requested to submit at the earliest date practicable any information bearing on the subject you may desire, or if you prefer, I will give you a personal hearing any time this month.

Very respectfully,

G. D. FITCH,
Lieut. Col., Corps of Engineers.

Mr. W. H. MILTON,
Marianna, Fla.

Letter of same tenor sent to J. W. Callahan, Bainbridge, Ga.

LETTER OF J. W. CALLAHAN.

BAINBRIDGE, GA., *July 15, 1911.*

DEAR SIR: Replying to yours of the 13th instant, since further investigation of the Chipola River I have about come to the conclusion that it would hardly be practicable to make this river navigable above Look and Tremble Falls.

So far as I am personally concerned, I do not care for a hearing, but if the people of Marianna, Fla., want it I have nothing to say.

Yours, very truly,

J. W. CALLAHAN,
President and General Manager Callahan Line

Lieut. Col. G. D. FITCH,
Corps of Engineers.

LETTER OF THE PRESIDENT OF THE MILTON LAND & INVESTMENT CO.

MARIANNA, FLA., *July 25, 1911.*

DEAR SIR: Your favor of the 17th received, in regard to the Chipola River. Some years ago, about 1897, I think, I procured an appropriation of $5,000 to expend on the clearing out of the upper Chipola, and that season carried down that river on barges about 850 bales of cotton. Then owing to changes made at Pensacola, it was more advantageous not to ship our cotton down the Chipola River. However, each Congress has continued to make appropriations for the Chipola River. I believe it was only a question of time when it would be desirable to utilize this river for transportation purposes. When I was in the United States Senate, I had a survey made for a canal connecting the Apalachicola River with St. Andrews Bay. This survey was made, and this canal is now being dredged. It will probably be completed within two or three years, then having access to a deep-water harbor this country and town and other towns would desire to ship cotton down the Chipola River through this canal for export. We will need to use this river as soon as the canal is opened. For this reason I desired a survey of the Chipola River made so that I could get an appropriation by Congress sufficient to so improve the river that our cotton and other freight could move up and down the river as soon as the canal was opened.

Therefore you can readily see that an adverse report made by you on the Chipola River would put back its utilization at least two or three years. From my knowledge of the river I do not hesitate to say it is a river that could be made very useful by the expenditure of a small amount of money; $5,000 properly applied would remove all the dead heads and the overhanging limbs between Marianna and the lower

Digitized by Google

Chipola River. There is sufficient water in the river at all times of the year if it were properly utilized. In low water there are some shoals that can not be navigated, but if the banks were built in and the water forced to a narrower channel there would be ample water at all times to navigate this river. How much it would cost to do this work I do not know, and for this reason desired a survey with the view of improving in connection with the canal. I have had the wording of the appropriation for this river changed to read so much appropriated for the Chipola River from Marianna down, in order that to properly and legally expend this appropriation work would have to commence at Marianna, with a view of utilizing this river according to the above plan.

The Callahan Co., of Bainbridge, has built a boat to navigate the upper Chipola River, and another company owns a boat that was built with this navigation in view.

It is true that the commerce on this river at this time is practically nil, but the prospective commerce is great, and I think preparations and estimates should be made at this time so that the river would be ready to handle commerce by the time this canal between Lake Wimico and St. Andrews Bay is completed. I sincerely hope that you will revise your report in order not to delay the improvements of our country.

Yours, truly,

W. H. MILTON, *President.*

Lieut. Col. G. D. FITCH,
Corps of Engineers.

O

Digitized by Google

D
year
clear
about
advan
has co
question
posee. W
necting t
this canal
years, then
would desire
will need to
survey of the
sufficient to so
down the river a

Therefore you
River would put
edge of the river
useful by the expen
remove all the dead h

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 464.

SANTA BARBARA HARBOR, CAL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF EXAMINATION OF SANTA BARBARA HARBOR, CAL.

JANUARY 18, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 17, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 13th instant, together with copy of a report from Capt. C. T. Leeds, Corps of Engineers, dated July 28, 1911, of a preliminary examination of Santa Barbara Harbor, Cal., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 13, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated July 28, 1911, by Capt. C. T. Leeds, Corps of Engineers, on preliminary examination called for by the river and harbor act approved February 27, 1911, of Santa Barbara Harbor, Cal.

Santa Barbara is situated about 90 miles northwest of Los Angeles Harbor and 43 miles east of Point Conception. For a distance of about 57 miles in this vicinity the coast line is nearly east and west. The harbor is protected on the north, west, and east by the mainland

Digitized by Google

and on the south by the Santa Barbara Islands, which form an almost continuous natural breakwater for nearly 62 miles, and it is exposed only to southeast gales. The Santa Barbara Channel lies between the islands and the main shore, its width at the eastern entrance being about 11 miles and at its western entrance 27 miles.

The improvement desired appears to be a breakwater to afford more perfect protection so that vessels may lie in safety at all times. As stated above, the harbor is protected from all directions except the southeast, and when severe storms come from that direction vessels can find shelter under the lee of the islands. It appears, therefore, that there is no very urgent need for additional protection.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated September 5, 1911, attention is invited. The board concurs with the district officer and the division engineer in the opinion that Santa Barbara Harbor, Cal., is not worthy of improvement by the General Government.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Santa Barbara Harbor, Cal., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF SANTA BARBARA HARBOR, CAL.

UNITED STATES ENGINEER OFFICE,
Los Angeles, Cal., July 28, 1911.

SIR: I have the honor to submit the following report of a preliminary examination of Santa Barbara Harbor, Cal., made in compliance with the provisions of river and harbor act approved February 27, 1911, and department letter of April 7, 1911.

A survey of Santa Barbara Harbor was made in 1878 by Lieut. Col. C. S. Stewart, Corps of Engineers, in compliance with river and harbor act of June 18, 1878. A report of this survey is found in Annual Report of the Chief of Engineers for 1879, page 1769. The plan of improvement proposed was for a breakwater 1,320 yards long at a cost of $3,571,232. His recommendation, however, was adverse.

A project for excavating a basin at El Estero, in the vicinity of Santa Barbara, was prepared in 1873 by Lieut. Col. Stewart in compliance with instructions dated June 20, 1873. The estimated cost of this project was from $8,145,954 to $9,537,454, and the recommendation adverse.

Santa Barbara is situated on the coast between Point Conception and Point Hueneme on the northern shore of the Santa Barbara Channel. The coast line from Point Conception runs almost due east for a distance of about 57 miles. The city is in a sheltered posi-

Digitized by Google

tion, being protected on the north by a range of mountains nearly 3,000 feet in height, which here are very close to the coast, and on the south by the Santa Barbara Islands, which lie at a distance of about 25 miles. Its mild climate and great natural beauty, together with the improvements which have been made here, serve to make this a very attractive resort at all seasons of the year. A great variety of fruits flourish here, as well as the various grains. The amount of arable land lying between the shore and the mountain range, however, is very limited. The population has grown from about 5,000 in 1879 to a present population of about 12,000.

Santa Barbara Channel is almost perfectly protected from the south by the channel islands, which are the peaks of a partially submerged mountain range, having its continuation on the mainland in the Sierra Santa Monica. This island group forms an almost continuous natural breakwater for nearly 62 miles, some of the peaks being over 2,000 feet high. The eastern entrance to the channel between Anacapa Island and Point Hueneme is about 11 miles wide. The western entrance between Point Conception and San Miguel Island is about 27 miles wide. The prevailing winds on this coast are from the west and northwest. From these the roadstead is thoroughly protected by the mainland. It is, however, open to the southeasterly gales, which are liable to occur during the three or four months of the rainy season. The holding ground here is good, and the lighters formerly used in discharging freight from vessels have been known to outride the storms. Should a southeast storm come on, however, vessels, by running a few miles offshore, can find a lee under Santa Cruz or other islands on the opposite side of the channel.

A commercial wharf here, about 1,850 feet long, belonging to the Stearns Wharf Co., affords the only commercial facilities which are believed to be extended to all on equal terms. There are no mechanical appliances on this wharf for handling freight. At this wharf there is an available depth of 21 feet at mean lower low water. During the calendar year 1910 the commerce passing over this wharf amounted to 30,900 tons.

Concerning the products of this section, the chamber of commerce states as follows:

> Santa Barbara County now produces beet sugar to the amount of $1,500,000; beans, $1,295,000; barley, $500,000; live stock, $300,000; English walnuts, $280,000; and lemons, $200,000, with a total of agricultural and horticultural products amounting to $6,000,000, while the oil output considerably exceeds this figure.

Three principal arguments have been advanced to me for advocating Federal improvement of Santa Barbara Harbor: First, to benefit commerce; second, for a naval harbor; and third, as a harbor of refuge.

As regards commerce the present facilities seem to be ample for all the existing or immediately prospective water-borne commerce of Santa Barbara. Moreover, the country tributary thereto is so limited in area that it is doubtful if increased protection would develop this commerce to any great extent. Mention is made in some of the inclosed communications of the possible construction of a railroad from Santa Barbara into the San Joaquin Valley. The cost of construction and operation of such a railroad would be so great, however, that its materialization in the near future is believed to be very doubtful.

Digitized by Google

I have been informed that the Santa Barbara Channel has been definitely adopted by the Navy as a testing speedway for its vessels and that several naval officers have expressed their belief in the desirability of the construction of a breakwater at this point. The inclosed letter from the Secretary of the Navy, however, declining to express any opinion on this point or to call for a report from any officer of the Navy, would seem to indicate that need of such is not great.

The remaining ground for advocating a breakwater is the need of a harbor of refuge for fishing vessels and the coastwise trade, practically all of which passes through the Santa Barbara Channel. It is true that there is a very considerable amount of fishing done off the coast of southern California, and the residents of Santa Barbara inform me that the best fishing grounds are in the Santa Barbara Channel. Statistics obtained from the Santa Barbara Chamber of Commerce show that during the calendar year 1910 there was a local consumption of fish of approximately 125 tons. In addition to this 415 tons were shipped out by express. It is thought that this industry is not sufficient to warrant a breakwater for fishing interests.

Referring to the alleged need of a harbor of refuge for the coastwise trade, there is inclosed herewith a list of vessels involved in disaster off the coast of California, within a radius of 40 miles of Santa Barbara, during the 10 years preceding June 30, 1910, as shown by the records of the Life-Saving Service. An examination of this list shows apparently only 5 vessels wrecked in storms, with a total value of property lost of $21,550, or an average annual loss of $2,155. During these 10 years the records show no loss of life. This record would not seem to indicate need of a harbor of refuge at this point.

There are no questions of water power or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

It is therefore believed inadvisable for the Federal Government to undertake any improvement of Santa Barbara Harbor at this time.

Very respectfully, your obedient servant.

CHAS. T. LEEDS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE, PACIFIC DIVISION,
San Francisco, Cal., July 31, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in views expressed by the district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

Digitized by Google

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 5, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Santa Barbara is situated about 90 miles northwest of Los Angeles Harbor, and 43 miles east of Point Conception. For a distance of about 57 miles in this vicinity the coast line is nearly east and west. The harbor is protected on the north, west, and east by the mainland, and on the south by the Santa Barbara Islands, which form an almost continuous natural breakwater for nearly 62 miles, and it is exposed only to southeast gales. The Santa Barbara Channel lies between the islands and the main shore, its width at the eastern entrance being about 11 miles and at its western entrance 27 miles.

The commercial wharf affords practically the only facilities for handling the water-borne commerce of the locality, and it is reported that during the year 1910 the commerce passing over this wharf amounted to 30,900 tons. Owing to the natural conformation of the adjacent country agricultural development is limited to a narrow strip along the coast, and although much of this is extremely fertile a very great tonnage can not be expected.

The improvement desired appears to be a breakwater to afford more perfect protection so that vessels may lie in safety at all times. As stated above, the harbor is protected from all directions except the southeast, and when severe storms come from that direction vessels can find shelter under the lee of the islands. It appears therefore that there is no very urgent need for additional protection. Fishing and coastwise vessels would receive the greatest benefit from the improvement, but it seems clear that these benefits would not be sufficient to justify the cost of a breakwater, which would undoubtedly be large. In view of the circumstances briefly outlined above, the board concurs with the district officer and the division engineer in the opinion that it is inadvisable for the Federal Government to undertake the improvement of Santa Barbara Harbor at the present time.

Consideration has been given to a number of letters from interested parties accompanying the report of the district officer, but no communications have been received by the board in response to the district officer's notification of his unfavorable report. There are no questions of terminal facilities, water power, or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF THE VICE PRESIDENT SANTA BARBARA CHAMBER OF COMMERCE.

SANTA BARBARA, CAL., *April 22, 1911.*

DEAR SIR: A copy of your notice regarding the advisability of improving Santa Barbara Harbor has been handed to me, in order that I may express my personal opinion regarding it. This copy reached me through the kindness of Mr. M. M. Potter, of the Potter Hotel, and it gives me great pleasure to respond to it.

Digitized by Google

I might say, by way of explanation, that my ideas regarding the future welfare of Santa Barbara might be considered somewhat practical, as I have been, more or less, closely identified with the growth and needs of our city for the past five years, being on some active civic committees with the chamber of commerce, and also being a member of the board of public works for the year 1910.

Santa Barbara is to-day suffering severely from the fact that she can not enjoy all the privileges accorded to a deep-water harbor port of entry, and to a port where any steamers plying along the Pacific coast can enter and touch at the wharf.

By reason of the early completion of the Panama Canal, the importance of the improvement of Santa Barbara Harbor is self-evident; furthermore, as Santa Barbara Channel is the testing speedway of new vessels of the Government, and also that the greater importance of naval protection is recognized by our officials in Washington, it seems imperative that such improvements should be given to our harbor as will facilitate all future needs.

I wish especially to call attention to the fact that surveys have been made for a railroad from the San Joaquin Valley through the Santa Ynez Mountains to Santa Barbara, the building of which will take place at no great future date, and which will compel greater harbor facilities.

Thanking you for a consideration of these suggestions, I am,

Very truly, yours,

G. W. McCombber,
Vice President Chamber of Commerce.

Lieut. C. T. Leeds,
Corps of Engineers.

LETTER OF THE SECRETARY OF THE NAVY.

Navy Department,
Washington, May 16, 1911.

Dear Sir: I am in receipt of your letter of the 5th instant, in regard to your effort to secure a breakwater for Santa Barbara.

In reply, I would inform you that I do not consider that the matter is one which concerns the Navy, except incidentally, and on that account I do not care to give any expression of opinion in the matter, nor to have any officers of the Navy give theirs.

I regret that my answer does not meet your wishes in the matter.

Faithfully, yours,

G. v. L. Meyer.

Mr. Samuel P. Caley,
Chairman Committee of the Chamber of Commerce,
Santa Barbara, Cal.

LETTER OF JOHN A. HOOPER.

San Francisco, Cal., *May 17, 1911*

Gentlemen: Replying to your letter (no date) received some time ago, in regard to the advantages of a breakwater at Santa Barbara, beg leave to state that there is no question that what a breakwater would be of great advantage, commercially, to Santa Barbara. I am not competent to pass on whether a breakwater could be built with any reasonable expenditure and would prefer to leave that feature of the case to the Army officers who are familiar with that class of work and whose judgment would be better than anyone I know of.

It seems to me the first thing to find out is whether a breakwater is practicable from an economic point of view. Commercially, it would be a tremendous advantage to Santa Barbara if a breakwater could be built that would protect the harbor at all times.

Yours, very truly,

John A. Hooper.

Chamber of Commerce,
Santa Barbara, Cal.

Digitized by Google

LETTER OF CHAMBER OF COMMERCE OF SANTA BARBARA COUNTY.

SANTA BARBARA, CAL., *May 28, 1911.*

DEAR SIR: We, the Chamber of Commerce of Santa Barbara County, hereby submit to you our views concerning the commercial importance of a breakwater at Santa Barbara.

Santa Barbara County now produces beet sugar to the amount of $1,500,000; beans, $1,295,000; barley, $500,000; live stock, $300,000; English walnuts, $280,000; and lemons, $200,000, with a total of agricultural and horticultural products amounting to $6,000,000, while the oil output considerably exceeds this figure.

With the building of storage reservoirs to impound the winter storm waters for the irrigation of our fertile valleys, the amount of the agricultural products will be wonderfully increased. One such irrigation project is now well under way. We refer to the great municipal water project of the city of Santa Barbara.

This project contemplates, first, the driving of a 4-mile tunnel from the city through the Santa Ynez Mountain to the river beyond, all but 3,000 feet of which is already excavated, with bonds voted sufficient for its completion, which at the present rate of progress will be accomplished within the next 12 months.

The second feature of the project contemplates the building of a storage reservoir on the Santa Ynez River to impound a vast body of storm water, sufficient, when brought through the tunnel, to irrigate all the lands adjacent to the city. The quantity of water available is almost incalculable, for back of the reservoir site is a drainage basin of 207 square miles, on which there is an average annual rainfall estimated to be above 25 inches. For the season of 1910–11, by actual measurement, it has exceeded 50 inches.

By reason of irrigation thousands of acres now devoted only to pasture and hay will be transformed into orchards.

Transportation by water is said to be only about one-third the cost of railroad freight. Hence, with the cheapened rates certain to follow the completion of the Panama Canal, a large percentage of the products of this county will go to the eastern markets by water.

Also the completion of the canal will lead the people of the great San Joaquin Valley to seek the most direct outlet to the sea, to also enable them to get the benefits of cheap water transportation to the eastern markets. Take the region about the city of Bakersfield, for example. That city is situated in the heart of a farming district comprising millions of acres of fertile lands and having an output of oil annually amounting to many millions of dollars.

Now a railroad from Bakersfield to Santa Barbara would be the shortest possible route to tidewater. At the present time their nearest railroad connection with tidewater is at San Francisco or Los Angeles, a distance of approximately 250 miles either way. The distance from Bakersfield to Santa Barbara is less than 100 miles. Practically one-third of the way is already covered by a line from Bakersfield to Sunset, leaving only about 66 miles to be constructed to reach Santa Barbara. If the Bakersfield-Santa Barbara railroad were built, it would be 100 miles nearer from Fresno to Santa Barbara than from Fresno to San Francisco by rail, and Santa Barbara would become the shipping point for water transportation for all the San Joaquin country south of Fresno, which would include the counties of Fresno, Kings, Tulare, and Kern, comprising an inland empire, at the present time producing many millions of dollars' worth annually of agricultural, horticultural, and viticultural products, and which the irrigation and intensive farming of the future will multiply many times.

It is true that a railroad from Bakersfield to Santa Barbara would be an expensive one to build, as much of the way is mountainous. But the difficulties are only the same as are met with in other mountainous districts where railroads have already been constructed.

If a breakwater were built at Santa Barbara, thereby insuring a perfectly safe anchorage in all kinds of weather, then, in view of the approaching and now assured completion of the Panama Canal, the building of the Bakersfield-Santa Barbara railroad would become the logical solution of the San Joaquin Valley transportation problem.

With the completion of the canal, the railroad and the breakwater both become necessary, and the building of the former would be sure to follow the construction of the latter.

C. S. STODDARD, *President.*
FRANK E. KELLOGG, *Secretary.*

Lieut. C. T. LEEDS,
Corps of Engineers.

Digitized by Google

RESOLUTION OF SANTA BARBARA COUNCIL.

Proceedings of the council, regular meeting, June 1, 1911.

Present: Mayor Clio L. Lloyd, Councilmen A. J. Abraham, E. E. Arellanes, E. G. Dodge, J. T. Johnson, W. C. Show, J. W. Smith. Absent, M. B. McDuffie.

A resolution signed by S. Arnold, member of the breakwater committee of the chamber of commerce, was introduced by Councilman E. G. Dodge, as follows:

Whereas it is the opinion of this body that a breakwater in the harbor of Santa Barbara would vastly promote the commercial importance of the town and stimulate and give an impetus to the development of the great wealth of the surrounding country, agricultural, mineral, etc.:

Resolved, That the mayor and city council earnestly indorse and support the efforts of the chamber of commerce, the commercial club, and citizens of Santa Barbara in their efforts to secure such a protection as will make the harbor a safe anchorage under all conditions of weather.

On unanimous vote of the council the resolution was adopted and ordered filed.

STATE OF CALIFORNIA,
County of Santa Barbara, City of Santa Barbara, ss:

I hereby certify the foregoing to be a full, true, and correct copy of a resolution regarding breakwater for the Santa Barbara Harbor and proceedings of the council regarding same, as appears on file and of record in my office.

Witness my hand and the corporate seal affixed hereto this 8th day of June, 1911.

[SEAL.] ALFRED DAVIS,
City Clerk and ex officio Clerk of the Council.

LETTER OF PACIFIC COAST STEAMSHIP CO.

SAN FRANCISCO, *June 16, 1911.*

SIR: We cordially indorse the efforts of the chamber of commerce, the city council, and commercial club of Santa Barbara to secure a safe anchorage at that port for large and small vessels at all seasons of the year.

We believe that a breakwater would be of material aid in promoting the progress of the town from a commercial standpoint, for though the present commerce is insignificant, there is much wealth, agricultural and mineral, in the country tributary to the port, and where harbors are rendered safe and accessible for commercial purposes at ports favorably located, trade will usually follow.

Yours, truly, GEO. H. HIGBEE,
Vice President and Manager.

Lieut. CHAS. T. LEEDS,
Corps of Engineers.

LETTER OF MR. FRANK LARCO.

SANTA BARBARA, CAL., *July 6, 1911.*

SIR: Replying to your request, I have to state that my books show approximately 2 tons per week, or 100 tons of fish sold annually for consumption in Santa Barbara.

In addition, there are three fish peddlers whose sales I estimate to be at least 50,000 pounds, or 25 tons, annually, making a total consumption of 125 tons.

As to the increase in the trade through the benefits of a breakwater, I think one-fourth more is a low estimate, as a safe harbor in all weathers would attract more vessels to make their headquarters here.

Very respectfully, FRANK LARCO
(Of Larco & Co.).

The SECRETARY COMMITTEE ON HARBOR IMPROVEMENTS.

Digitized by Google

List of vessels involved in disaster off the coast of California, within a radius of 40 miles of Santa Barbara, Cal., during the period July 1, 1900, to June 30, 1910, as shown by the records of the Life-Saving Service.

Date of disaster.	Description and name of vessel.	Tonnage.	Nature of disaster and locality in which it occurred.	Value of property involved.	Value of property lost.	Persons on board.
Dec. 6, 1900	Steamer Cleone....	197	Struck rocks off. Point Gorda, Cal.	$25,000	$25,000	16
Mar. 27, 1901	Schooner Roy Somers.	314	Struck rock about 5 miles off San Miguel Island.	29,000	4,000	8
Feb. 9, 1902	Schooner Occidental.	209	Stranded in gale 10 miles South of Point Gorda, Cal.	10,000	10,000	8
Apr. 9, 1902	Schooner Kate and Anna.	24	Stranded in gale on San Miguel Island.	4,000	4,000	6
Apr. 6, 1903	Steamer Alliance...	679	Struck rock a little south and west of Point Gorda, Cal.	76,000	3,000	57
Oct. 19, 1903	Schooner Iaqua....	712	Stranded in fog on Point Gorda, Cal.	80,000	3,000	29
Mar. 12, 1905	Sloop Pride.....	12	Stranded in gale at Santa Barbara, Cal.	3,500	3,500	2
Sept. 3, 1905	Schooner J. M. Colman.	463	Stranded in fog on San Miguel Island.	32,000	28,000	10
June 19, 1906	Barkentine Portland.	493	Stranded in fog 1½ miles west-northwest of Hueneme Light.	18,000	6,000	10
Oct. 5, 1906	Steamer Shasta....	722	Stranded in fog ¾ mile east ½ south of Point Conception.	112,000	112,000	16
Dec. 25, 1906	Steamer Del Norte.	450	Stranded in gale on Point Gorda, Cal.	77,000	2,400	22
Feb. 2, 1908	British schooner Ella G.	25	Stranded in gale in Beecher Bay, Santa Rosa Island.	1,650	1,650	9
July 21, 1908	German steamer Anubis.	4,763	Stranded in fog on San Miguel Island.	200,000	68,900	65
Jan. 9, 1909	Steamer Pasadena..	300	Stranded in fog near Point Conception.	25,000	1,600	18
Jan. 21, 1909	Schooner Ensign...	618	Stranded in fog near Naples, Cal.	40,000	40,000	10
May 25, 1910	Schooner Dora Bluhm.	330	Stranded in darkness south point of Santa Rosa Island.	15,000	15,000	8
	Total (16 vessels).	10,311	.....	748,150	328,050	294

LETTER OF SANTA BARBARA AGENT OF WELLS, FARGO & CO. EXPRESS.

SANTA BARBARA, CAL., *July 19, 1911.*

DEAR SIR: In reply to your verbal request to furnish you with the total number of pounds of fish that was expressed from this port during the past year, 1910—this data, we understand, is only for the benefit of your committee—we handled 830,000 pounds in that period.

We wish you every success in this undertaking, and if we can render you any further assistance, kindly advise us.

Yours, truly, P. B. GATES, *Agent.*

COMMANDER SOLON ARNOLD,
Breakwater Committee, City.

CLIPPING FROM THE INDEPENDENT, A NEWSPAPER PUBLISHED AT SANTA BARBARA, CAL.

Oil for the Navy and the development of Santa Barbara.—Announcement is made that the Navy Department, after long deliberation, has decided to use oil instead of coal on the ships of the Pacific Fleet and that oil-supply stations will be established at several points along the coast.

This announcement means much for California and for Santa Barbara County in particular. It means that the Government will be a purchaser in the future of millions of barrels of oil annually, and a large portion of it will come from the oil fields of California.

And once the start is made it is entirely unlikely that the use of oil for fuel for the ships of the Navy will be confined to the Pacific coast. Oil is more easily handled and transported than is coal, and colliers will in time be succeeded by tank ships and

Digitized by Google

oil stations will be established at all United States naval supply stations. Tank ships will accompany the fleets, because it will be an easy matter to take on a load of oil at sea from a tank ship.

In this connection the future of Santa Barbara looms up big on the horizon if the people of this community are not opposed to commercial progress. Santa Barbara is the nearest ocean port to the great oil fields of California, and with a breakwater insuring a safe harbor for all classes of vessels at all times this should become the most important oil-shipping port along the coast. Get the breakwater here and the rest of the program will be comparatively easy. The pipe lines from the oil fields will find their way to Santa Barbara because of the safe harbor. This port would become a regular base of supplies for the Navy and tank ships would be loading here continuously. The commercial importance of Santa Barbara as an ocean port would be assured, and merchant ships from all Pacific coast points en route to the Panama Canal would be very likely to make this a port of call.

The construction here of a harbor quiet at all times would be the first step in the development of important commercial interests for Santa Barbara. With such a harbor the proximity of the great oil fields would make Santa Barbara the fourth commercial port in California, San Francisco, San Pedro, and San Diego being the only ports that should exceed it in importance.

Dreams, do we hear some say? Possibly. But if the Government should construct a breakwater here, the dream is almost certain to be realized, as the croakers and opponents of progress could not then block the manifest destiny of Santa Barbara. The transfer of oil to ships would not give employment to a great army, but it would require a considerable number of men and the docking of ships here would mean great additions to the business of the place.

Let everybody boost for the breakwater.

LETTER OF THE COMMERCIAL CLUB OF SANTA BARBARA.

SANTA BARBARA, CAL., *May 26, 1911.*

DEAR SIR: Your communication of April 19, 1911, relative to the securing of information bearing upon the importance of improving the harbor of Santa Barbara, and asking that civic bodies and prominent citizens submit such information as may be available to them, was duly received.

In behalf of the commercial club, we desire to present for your consideration and that of your department some suggestions and data upon the subject mentioned

The subject is not a new one by any means. It was agitated in 1869, when Congress was asked to make an appropriation for a breakwater at Santa Barbara, but the matter was dropped before it assumed any definite shape.

On January 16, 1873, at a public meeting of the citizens of Santa Barbara, the following resolution was adopted:

"*Resolved*, That our Senators and Representatives in the Congress of the United States be requested to solicit from the Government, at the earliest practicable period, an appropriation of $100,000 for the construction of a breakwater at the port of Santa Barbara for the benefit of commerce and navigation."

On February 5, 1878, a strong petition to Congress was made by the people of Santa Barbara, in which it was set forth that "your petitioners therefore represent that a breakwater is necessary to be constructed at Santa Barbara by the Government of the United States as the only secure means of transmitting freight and passengers to and from this city and to protect and preserve our freight and commerce."

This petition represented that the material necessary for the construction of the breakwater could be found within 2 miles of the beach, and asked for an appropriation of $200,000 for the purpose of such construction. Public meetings in the interest of the improvement were held by the citizens, and the subject was a live one for some time.

The subject of a breakwater was next agitated by the Chamber of Commerce of Santa Barbara in 1907, and on the 18th of January of that year the following resolution was adopted by the board of directors of that body, to wit:

"*Resolved*, That a committee of five persons be named by the president of this board, which committee shall take such measures as may be necessary to have a survey of the harbor of Santa Barbara made by the Federal Government, with a view of ascertaining what improvements are needed to make it safe under all conditions of weather, and the estimated cost of same."

In pursuance of this resolution a committee of five prominent citizens was appointed of which the late Admiral B. H. McCalla was chairman.

The matter was taken up by this committee and much valuable data gathered. A memorial on the subject of harbor improvement for Santa Barbara was sent to Congress,

Digitized by Google

and letters to the Representatives and Senators from California were written by order of the committee. The death of Admiral McCalla caused a cessation of work on the subject, and the present agitation is practically a revival of that movement.

The people of Santa Barbara have long felt that the greatest boon the Federal Government could vouchsafe to this city would be the construction of such works as would practically make its harbor the best on all this western shore.

And it is beyond question that harbors are sadly needed, for one of the peculiar features of the Pacific coast of the United States, exclusive of Alaska, is the paucity of harbors of refuge.

Almost everywhere along this extended coast line the shores rise abruptly from the waves, and it is only in exceptional instances that this shore line is broken by inlets that offer a promise of safety to the storm-tossed ship.

Were the Pacific Ocean as stormy and tumultuous as the Atlantic, the few harbors found on this western shore would be all too inadequate for coastwise trade, as it now exists. It is this comparative immunity from frequent gales that has permitted our scanty commerce to exist with as few casualties as it has suffered.

The time is at hand in the development of this western littoral when more harbors will be needed to insure the safe conduct of the increasing business as well as for the safety of the Nation's Navy. Even now, at certain seasons of the year, the need is very great, for the wide distance that separates the harbors of refuge along the coast of California means that many ships are taken at a disadvantage by storms, and must weather many gales, with much damage, which they would entirely escape were ports more frequent.

On the California coast there are practically but three landlocked bays which afford harbors of refuge. To these the construction of the artificial harbor at San Pedro will add a fourth. For such a length of shore line this number is very inadequate, and when we remember that entry to these landlocked bays is jeopardized during storm or fog by narrow passage or dangerous bar, it becomes the more important that a harbor of refuge should be provided which may be entered with safety under any and all conditions.

The roadstead of Santa Barbara is situated in a protected cove or bay in the northern shore of the Santa Barbara Channel, without doubt the most placid bit of salt water that washes the shore line of the United States.

At Point Concepcion, one of the most prominent headlands of the Pacific coast, the shore line takes an abrupt turn to the eastward and for a distance of some 70 miles, has an almost exact east and west direction. Then it gradually curves southwardly until the general north and south direction, which obtains north of Point Concepcion, is again reached along the shore of San Diego County.

Almost inclosing the channel of Santa Barbara on the south are the Channel Islands, formed of a partially submerged mountain range which has its continuation on the mainland in the Sierra Santa Monica, rising to a height of nearly 3,000 feet. This island group forms an almost continuous mountain wall for nearly 70 miles, some of the peaks being over 2,000 feet above the sea. The eastern entrance to the channel, between the Anacapas and Point Hueneme, is about 11 miles wide. The western entrance, between Point Concepcion and San Miguel Island, is about 27 miles wide. For more than half the year the prevailing winds on the coast of California are the northwest trades. From these regular visitants, as well as from all northwesterly, northerly, and easterly winds, coming at any time of year, the roadstead of Santa Barbara is perfectly protected. There remains, therefore, but one direction from which a wind may blow to the disadvantage of Santa Barbara, viz, southeast.

In the olden days when Richard Henry Dana was serving "before the mast" in the old brig *Pilgrim*, the favorite method of avoiding a possible heavy southeaster was to pull up anchor and make for the lee of the Channel Islands at the first indication of a blow. But a harbor from which a ship must run to cover is not a perfect harbor, and the works necessary to make it such are a breakwater against the rough water produced by a southeasterly wind and a shorter breakwater against a certain southwesterly ground swell which sets in from the Pacific after a storm outside.

These improvements would make the roadstead of Santa Barbara the safest harbor on the coast of California at any time of the year and under all possible circumstances. Not only the safest, but the most easy of access in any condition of wind or tide; for here no pilot would be needed to thread the mazes of a narrow and treacherous channel, no bar would pound the life out of a ship as it wrestled in the grasp of mighty billows. It would be the harbor par excellence of all the ports of the Western Sea.

The first survey of the harbor of Santa Barbara after its possession by the United States was that undertaken by the Coast and Geodetic Survey in 1852. On the margin of the map of this survey, among other matters of interest to seamen, was the following statement:

Digitized by Google

"In the winter anchor outside the kelp and far enough to the westward to be able to clear the land should a southeast gale (which frequently occurs during that season) make it necessary to get under way."

"Between the lines marked thus —— there is a thick bed of kelp; vessels may pass through it anywhere with safety."

Since the above-mentioned geodetic survey no examination, so far as we can learn, has ever been made by the Government to determine what improvements are necessary to make the harbor of Santa Barbara secure in every possible storm, nor has any estimate been made as to the cost of such improvements.

From the Bay of San Francisco to San Diego, with the exception of the artificial shelter being created at San Pedro, there is no place of safety for the vessels of our Navy in a northwest gale save at Santa Barbara. With the creation of a breakwater against the southeasterly gales this immunity would continue throughout the year and the ease with which the harbor can be approached and entered makes it the ideal rendezvous for naval craft of all kinds. Its proximity to the course over which the war dogs of Uncle Sam make their trial runs and the satisfactory conditions for target practice in the immediate vicinity are additional reasons why this port, with proper improvements, will become an important naval station.

While the commerce of Santa Barbara is, as yet, of minor importance, the future possibilities are very great. Here will be one of the great cities of the Pacific coast when its littoral shall be developed as is now that of the Atlantic. Whatever Bostons, Philadelphias, Baltimores, and Charlestons may spring up here, Santa Barbara will not be among the least. The great wealth of undeveloped resources now lying in the mighty San Joaquin Valley will one day find its outlet at Santa Barbara and a protected harbor here will hasten the development of that fertile region.

As this may be made the "perfect harbor," if such anywhere exists, it is not too sanguine an outlook to conceive that here may become a commercial port where the wealth of the Orient shall find its first landing on this continent.

The completion of the Panama Canal will mean an added demand for more and better harbors on the Pacific shore. This ocean is the coming theater of the world's action. Over its waters the argosies of the globe will carry their "costly bales" between the most densely peopled shore lines of the earth.

In the city of Santa Barbara and its environs reside some 20,000 inhabitants. In 1900 the number was about 10,000. Can we not with confidence predict a population in 20 years of sixty to seventy thousand. The population of the whole Pacific coast is growing by leaps and bounds and as the pressure of numbers in the East grows more intense and the means of transportation more convenient, so will the commerce and passenger traffic multiply. With its peerless climate and wonderful land and sea scape, Santa Barbara will attract thousands where but hundreds come now.

The yachting interests of the Atlantic, when easy transfer by way of the Panama Canal is assured, will here find their winter playground.

The superior advantages of the Santa Barbara Channel as a yachting course would mean that here would be the yachting center of the Pacific coast were a breakwater provided behind which light craft might lie in safety during the southeasterly winds that come in the rainy season.

The congregation of these expensive, numerously manned, and luxuriously appointed vessels, with the large expenditure consequent on their maintenance, will mean a great impetus to the business and commerce of this port. Not only would Santa Barbara be a winter rendezvous for the pleasure craft of the Atlantic, but of the North Pacific as well, for the reason that the frequent and long-continued rains of northern California, Oregon, Washington, and British Columbia prevent the use of such vessels to any extent in those sections during the winter.

The fishing interests of the Santa Barbara Channel and the adjacent islands are growing in importance every year, and with a protected harbor at Santa Barbara would develop into a very large industry, supporting many persons, Many varieties of edible fish are found in this vicinity, and Santa Barbara is the natural depot for those engaged in catching them. At present San Pedro is their nearest harbor of refuge in the winter season, and its distance greatly retards the development of the industry.

In addition to the foregoing, we might weary you with an extended rehearsal of statistical information concerning the exports and imports of Santa Barbara, the area, character, and productions of the territory tributary thereto and the various industries possible under an improved condition of its harbor, but we feel that we have advanced sufficient reasons to warrant a recommendation from you for the improvement of our harbor, and with these we rest our case.

Respectfully submitted.

COMMERCIAL CLUB OF SANTA BARBARA,
By C. M. GIDNEY, *Secretary*.

Lieut. C. T. LEEDS,
Corps of Engineers.

Digitized by Google

PETITION OF THE FISHING INTERESTS OF THE SOUTHERN CALIFORNIA COAST.

To the Chamber of Commerce of Santa Barbara, Cal.:

We, the undersigned, owners and masters of vessels engaged in the extensive industry of fishing in Santa Barbara Channel and adjacent waters, earnestly request that you will make every endeavor to secure a breakwater for Santa Barbara Harbor.

Many people in Santa Barbara and San Pedro depend on the fishing industry for support of themselves and families, and the business necessitates the employment of many small craft, which, in case of severe storms that frequently occur during the fishing season, must seek safe shelter.

Valuable fishing grounds are in the vicinity of Santa Barbara, and the San Pedro fleet must use these grounds; and, as the return distance to San Pedro is so great, they are compelled to use Santa Barbara to a great extent as its shipping port.

Under certain conditions of wind and sea which many times prevail, these fishing craft can not discharge their cargoes or even use the harbor as a place of refuge from the storms.

Compelled, therefore, to remain at sea until weather conditions permit them to enter port and discharge their cargo, they must necessarily suffer hardship, delay, and loss in their business; and it has sometimes happened that, caught unexpectedly in gales, the fleet, having no harbor of refuge convenient, has suffered not only loss of craft but loss of life.

We can not, therefore, too strongly urge the benefit and help that come to the fishermen by a protected harbor at Santa Barbara.

(71 signatures.)

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 471.

GILBERTS BAR (ST. LUCIE INLET), FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION OF GILBERTS BAR (ST. LUCIE INLET), FLA.

JANUARY 23, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 22, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 20th instant, together with copy of a report from Capt. George R. Spalding, Corps of Engineers, dated September 22, 1910, of a preliminary examination of Gilberts Bar, Fla., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 20, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated September 22, 1910, by Capt. George R. Spalding, Corps of Engineers, on preliminary examination called for by the river and harbor act approved June 25, 1910, of Gilberts Bar, Fla.

Gilberts Bar is now known as St. Lucie Inlet. Under authority of the river and harbor act approved March 2, 1907, a project for improvement of this locality contemplating a channel 18 feet deep from the ocean to an interior basin of similar depth was prepared and will be found printed in House Document No. 1312, Sixtieth Congress, second session. A supplemental report by the Board of Engineers

Digitized by Google

for Rivers and Harbors containing a modified project for a depth of 12 feet, prepared in compliance with a request from the Senate Committee on Commerce, will be found printed in Senate Document No. 423, Sixty-first Congress, second session. Neither of these projects has as yet been adopted by Congress, and the district officer states that conditions have not changed materially since they were submitted.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated October 11, 1910, attention is invited. The board, with the division engineer, concurs in the opinion expressed by the district officer.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of St. Lucie Inlet, Fla., as recommended in House Document No. 1312, Sixtieth Congress, second session, is advisable; and further, that no new facts are likely to be developed by another examination made at this time.

Very respectfully,

EDW. BURR,
Acting Chief of Engineers.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF GILBERTS BAR, FLA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., September 22, 1910.

SIR: In compliance with department letter of August 4, 1910, I have the honor to submit the following report on the preliminary examination of Gilberts Bar, Fla., described in river and harbor act of June 25, 1910.

Gilberts Bar, Fla., is now locally and officially known as St. Lucie Inlet, Fla.

As directed by the river and harbor act of March 2, 1907, and department letter of March 14, 1907, a preliminary examination of this inlet with a view to its improvement was made by Maj. F. R. Shunk, Corps of Engineers, and submitted under date of July 19, 1907. Subsequently a survey of this locality was made by me and a plan for the improvement suggested, and the improvement recommended as a worthy one for the General Government to undertake. This recommendation and plan was concurred in, in a somewhat modified form by the division engineer, Board of Engineers for Rivers and Harbors, and the Chief of Engineers, and the entire matter was presented by the Secretary of War to Congress under date of January 8, 1909, and printed as House Document No. 1312, Sixtieth Congress, second session.

Under date of March 10, 1910, the Chief of Engineers transmitted to the Committee on Commerce of the Senate of the United States a supplemental report of the Board of Engineers for Rivers and Harbors, presenting a modified project for a lesser depth than that proposed in the original report. This supplemental report can be found

Digitized by Google

in printed form as Senate Document No. 423, Sixty-first Congress, second session.

In view of the recent date of these reports and of the fact that conditions have not changed to any material extent, it is not thought that further report is necessary.

In my opinion the locality is worthy of improvement by the General Government.

Very respectfully,

GEO. R. SPALDING,
Captain, Corps of Engineers.

THE CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., October 1, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army.

I agree with the district officer that no new facts are likely to be developed by another examination made at this time.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 11, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

The district officer calls attention to two recent reports on the subject of Gilberts Bar, or St. Lucie Inlet, as it is now known, and states that conditions have not changed since those reports were submitted. As there is no new matter to present, he deems it unnecessary to make further report, and in this view the division engineer concurs.

The report submitted in compliance with the act of March 2, 1907, printed in House document No. 1312, Sixtieth Congress, second session, is in considerable detail. Interested parties were consulted, a public hearing was held in the locality, and an inspection of the inlet and adjacent territory was made. The subject was given careful study and consideration, and the board invites attention to that report, as it covers its views and recommendations, which were favorable to the improvement, subject to certain local cooperation. Anything further that it might say would be but repetition.

In compliance with the provisions of section 3 of the act of June 25, 1910, the board further reports that none of the questions of terminal facilities, waterpower, or other related subjects have any material bearing upon the improvement of the navigation of this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 472.

NEAH BAY, WASH.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF HARBOR OF REFUGE AT NEAH BAY, OR AT SUCH OTHER POINT IN THE VICINITY THEREOF AS WILL BEST SUBSERVE THE INTERESTS OF COMMERCE AND NAVIGATION.

JANUARY 23, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 22, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 20th instant, together with copy of report from Maj. C. W. Kutz, Corps of Engineers, dated April 13, 1911, on preliminary examination of a harbor of refuge at Neah Bay, Wash., or such other point in the vicinity thereof as will best subserve the interests of commerce and navigation, made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 20, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated April 13, 1911, by Maj. C. W. Kutz, Corps of Engineers, on preliminary examination of a harbor of refuge at

Digitized by Google

Neah Bay, Wash., or such other point in the vicinity thereof as will best subserve the interests of commerce and navigation, called for by the river and harbor act approved June 25, 1910.

The district officer is of opinion that if a harbor of refuge is to be established in this vicinity, it should be at Neah Bay, but at the present time the cost of such a harbor would be excessive when compared with resulting benefits. He therefore considers it inadvisable for the General Government to undertake at the present time the improvement of Neah Bay or other point in the vicinity thereof with a view to the establishment of a harbor of refuge, though he urgently recommends the establishment of additional aids to navigation.

This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report dated June 5, 1911, attention is invited. The board, with the division engineer, concurs in the unfavorable views of the district officer.

After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the establishment by the United States of a harbor of refuge at Neah Bay, Wash., or vicinity, is not deemed advisable at the present time.

Very respectfully,

EDW. BURR,
Acting Chief of Engineers.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF NEAH BAY, WASH.

UNITED STATES ENGINEER OFFICE,
Seattle, Wash., April 13, 1911.

SIR: In compliance with instructions contained in department letter of August 4, 1910, I have the honor to submit the following report of preliminary examination for harbor of refuge at Neah Bay, Wash., or such other point in the vicinity thereof as will best subserve the interests of commerce and navigation. The authority for this examination is contained in the river and harbor act approved June 25, 1910.

An examination of Neah Bay and that portion of the coast of Washington extending easterly past Clallam Bay was made by Capt. Arthur Williams, Corps of Engineers, on November 24, 1910, accompanied by First Lieut. Joseph H. Earle, Corps of Engineers. A duly advertised public hearing, at which interested parties were present or represented, was held in this office November 5, 1910. A personal examination of Neah Bay and vicinity was made March 2, 1911, the journey from Port Angeles to Neah Bay being made on the life-saving tug *Snohomish*, through the courtesy of its commanding officer, Capt. T. J. Haake, United States Revenue-Cutter Service.

Neah Bay has been considered twice in former years with a view to its improvement as a harbor of refuge. A report on the first examination, authorized by river and harbor act of 1896, is contained in House Document No. 139, Fifth-fifth Congress, second session.

Digitized by Google

In this report the opinion is expressed that Neah Bay is worthy of improvement as a harbor of refuge and that the improvement is justified by the interests of commerce involved. The division engineer, Col. Suter, concurred in this opinion. This examination was not followed by a survey. The river and harbor act of 1899 called for an examination of Neah Bay in the same terms used in the preceding river and harbor act. The report thereon was made by Capt. Taylor, who had written the first report on this subject, and in it the opinion was again expressed that Neah Bay was worthy of improvement as a harbor of refuge. This opinion was also concurred in by the division engineer, Col. Mansfield. As a result of this second examination a survey was made and estimate of cost prepared, which was published in House Document No. 337, Fifty-sixth Congress, first session.

Clallam Bay, 15 miles east of Neah Bay, was examined with a view to its improvement as a harbor of refuge in 1899. The district officer's report, published in House Document No. 139, Fifty-fifth Congress, second session, was unfavorable to the improvement of Clallam Bay, but referred favorably to a similar improvement for Neah Bay.

Physical conditions in this vicinity have not materially changed since the reports above referred to were written, but for the sake of clearness the following brief description is included in this report:

The entrance to the Strait of Juan de Fuca, about 13 miles wide, lies between Cape Flattery, the extreme northwestern point of the State of Washington, and Bonilla Point, on Vancouver Island. The strait is of great depth at its center, but within 1½ miles of the shore line is generally under 40 fathoms. Neah Bay is inside the entrance to the strait and 5 miles east of Cape Flattery. Notwithstanding the great width and ample depth of water, the entrance to the Strait of Juan de Fuca is regarded by navigators as a dangerous point, an opinion which is borne out by the large number of wrecks that have occurred in that vicinity in former years. The actual conditions at this point can best be described by quoting from the United States Coast Pilot, as follows:

> The fogs are generally heavier near the entrance, decreasing in density and frequency up the strait. Near the entrance the fog sometimes stands like a wall, and vessels entering the strait run out of it into clear, bright weather. * * * In summer the prevailing northwesterly winds draw into the strait, increasing toward evening, and at times blowing a 10-knot breeze before midnight; this occurs, however, only when the winds are strong outside, and sailing vessels may be a week from Cape Flattery to Admiralty Inlet, or vice versa. In winter southeasterly winds draw out of the strait, causing a heavy cross sea off the entrance, the heavy southwesterly swell meeting that coming out. Under these conditions vessels, especially sail, make Neah or Clallam Bays and await more favorable weather. The weather off the entrance in winter is, as a rule, exceptionally severe and wrecks are of frequent occurrence; the heavy broken seas are probably due to the shoaling off the entrance, the inequality and velocity of the currents, and the conflict between the wind drawing out of the strait and that along the outer coast.

Neah Bay lies between Koitlah Point and Waaddah Island. It is protected from west, south, and east winds by the mainland, and from northeast winds by Waaddah Island; it is not protected from the north and northwest, but swells due to any westerly storms, even southwest storms, make it uncomfortable for vessels at anchor. The anchorage space is about 1 mile by a half mile, with depths from 20 to 50 feet, and the holding ground is said to be good. Between Waaddah Island and the mainland is a channel 250 yards wide and

Digitized by Google

22 feet deep, which forms an eastern entrance to the bay and is used habitually by tugs and small boats, including the steamer which comes to Neah Bay from Seattle three times each week.

The only other site in the vicinity which comes within the scope of the examination is Clallam Bay, the objections to which are well set forth in the report on that harbor made in 1895. Port Angeles, lying 56 miles from the cape, has an excellent harbor, with ample protection for vessels in time of storm. It is a natural harbor of refuge, but, in the opinion of navigators, is too far from the entrance to meet all the requirements of commerce and navigation.

Because of its proximity to the entrance of the strait and because of the relative ease with which it can be converted into a secure harbor of refuge Neah Bay presents the most favorable site for an improvement of this character, and if a harbor of refuge is to be established in this vicinity it should unquestionably be built at Neah Bay.

The foreign commerce to and from Puget Sound, except that going to and coming from British Columbia ports, passes through the Strait of Juan de Fuca. All domestic commerce, except a portion of the traffic with Alaska, which uses the channel east of Vancouver Island, also passes through the Strait of Juan de Fuca. There is practically no coastwise commerce that does not enter or leave the straits. The following is a statement of foreign commerce for the years 1904 to 1910, inclusive, as shown by records of the customhouse, district of Puget Sound:

Foreign commerce.

Years.	Number of vessels.		Tonnage.		Value.	
	Entrances.	Clearances.	Entrances.	Clearances.	Imports.	Exports.
1904	1,908	2,059	1,178,729	1,372,636	$11,285,086	$22,75[illegible]
1905	1,940	2,034	1,230,207	1,433,708	7,378,328	43,574,[illegible]
1906	1,975	2,136	1,401,840	1,533,948	12,614,438	[illegible]
1907	2,159	2,277	1,545,762	1,736,889	25,353,373	[illegible]
1908	2,465	2,642	1,799,602	2,056,994	22,208,814	[illegible]
1909	2,671	2,814	1,919,389	2,069,784	26,959,891	[illegible]
1910	2,501	2,596	1,766,680	2,049,330	28,910,491	[illegible]

The above table includes vessels entered from and cleared to British Columbia ports, part of which do not pass Neah Bay. For the year ending June 30, 1910, this part of the foreign commerce was as follows:

	Number of vessels.	Tonnage.
Entrances	2,347	[illegible]
Clearances	2,378	[illegible]

The collector of customs states:

Many of the vessels embraced in the foregoing passed Neah Bay inwards or outwards, or both, although entered or cleared in this district as destined from or to British Columbia. For instance, the steamships of the Pacific Coast Steamship Co., proceeding from San Francisco via Victoria to Puget Sound and the reverse, are entered and cleared, as from and to British Columbia, and the same conditions apply

Digitized by Google

to other traffic, but I have not sufficient data to estimate what proportion of these vessels and the aggregate tonnage that passed Neah Bay.

Included in this British Columbia commerce there are two regular steamers each way each day between Seattle and British Columbia ports which do not pass Neah Bay and a number of others which use the channel east of Vancouver Island.

The total imports for 1910, which include the receipts at certain subports not on Puget Sound, were as follows:

Imports for 1910.

Commodities.	Value.	Quantities.		
		As listed.		In short tons.
		Quantity.	Unit.	
Copper ore, matte, and bars	$3,282,478			[1] 16,412
Tea	1,767,588	10,033,034	Pounds	5,016
Tin in bars, pig, etc	348,472	1,083,092	do	541
Cement	129,940	36,273,980	do	18,136
Decorated earthenware	248,353			[1] 1,200
Manila hemp	1,227,846	9,720	Tons	9,720
Bags and burlaps	828,872			[1] 4,144
Fish and fish products	144,278			[1] 1,000
Matting	135,331	1,776,682	Yards	1,776
Rice	154,861	5,736,934	Pounds	2,368
Silk, raw and waste	15,269,308	4,653,743	do	2,327
All other articles	5,373,214			[1] 13,434
Total	28,910,491			76,074

[1] Estimated.

Of the total imports, those coming from British Columbia were valued at $5,638,197.

EXPORTS FOR 1910.

The total exports for 1910 which include shipments through certain subports not on Puget Sound, were as follows:

Commodities.	Value.	Quantities.		
		As listed.		In short tons.
		Quantity.	Unit.	
Live stock	$366,366			[1] 6,209
Barley	80,686	112,118	Bushels	2,691
Oats	289,120	602,729	do	9,644
Wheat	4,592,371	4,856,691	do	143,701
Wheat flour	5,417,231	1,296,681	Barrels	129,668
Copper and manufacturers of	221,397			[1] 1,106
Cotton, raw	2,120,267	32,954	Bales	8,234
Cotton cloth	5,762	45,886	Yards	23
Salmon, canned	3,331,174	32,406,477	Pounds	16,203
Fruit	673,608			[1] 13,472
Hay and feed	355,558	15,164	Tons	15,164
Iron and steel and manufacturers of	2,578,491			[1] 12,893
Leather and manufactures of	148,790			[1] 372
Paper and manufacturers of	328,568			[1] 2,054
Meat products	1,083,696			[1] 2,167
Eggs and dairy products	242,546			[1] 485
Malt liquors	67,910			[1] 905
Tobacco and manufacturers of	292,054			[1] 183
Lumber	2,663,810	204,572,000	Feet	306,858
All other articles	5,030,098			[1] 12,575
Total	29,889,473			664,626

Estimated.

Digitized by Google

Of the total exports, those going to British Columbia were valued at $8,103,359.

The following statement covers commerce to noncontiguous territory of the United States in 1910:

	Number of vessels.	Tonnage.	Cargo value.
Alaska	368	374,942	[illegible]
Hawaii	94	182,242	[illegible]

Part of the Alaska commerce and all of the Hawaiian commerce passes Neah Bay. No statistical record is kept of the vessels entered from Alaska and Hawaii, but the numbers of vessels and vessel tonnage coming from these countries does not differ materially from the figures given above for the outgoing commerce.

There is no known agency that keeps a record of the domestic commerce to and from contiguous territory passing Neah Bay, but the following table has been compiled from statements of the principal merchants and steamship companies engaged in trade with Californian ports and checked by comparison with the records of the harbor masters of Seattle and Tacoma:

Domestic commerce passing Neah Bay.

Commodities.		Quantities.	
		Imports.	Exports.
1909.			
Building material	tons	674	
Cement	do	69,434	
Coal	do		[illegible]
Hay	do	2,000	
Lumber	do		[illegible]
Mixed oils	do	[illegible]	
Miscellaneous	do	[illegible]	[illegible]
Total	do	743,282	[illegible]
1910.			
Building material	tons	1,000	
Cement	do	87,434	
Coal	do		[illegible]
Hay	do	2,000	
Lumber	do		[illegible]
Mixed oils	do	543,644	
Miscellaneous	do	313,372	[illegible]
Total	do	947,440	[illegible]

The best available information as to the total number of vessels passing Neah Bay is found in a record kept by the operator in charge of the United States Weather Bureau station of the number of vessels passing Tatoosh Island. No watch is kept between 8 p. m. and 4.30 a. m., and some vessels pass unobserved in rain and fog, so that the actual number of vessels passing Neah Bay is somewhat greater than that shown in the following table, which was compiled from the daily record:

Digitized by Google

List of vessels reported by operator in charge of United States Weather Bureau Station as passing Tatoosh Island between 4.30 a. m. and 8 p. m. from July 1, 1908, to June 30, 1910.

Date.	American steamer.	American sail.	American steamer tonnage.	American sail tonnage.	Foreign steamer.	Foreign sail.	Foreign steamer tonnage.	Foreign sail tonnage.	Fishing vessels.	Fish tonnage.	Government vessels.	Barges.	Tonnage.	Total vessels.
1908.														
July	54	10	142,490	5,411	24	8	135,423	3,934	8	1,819	7	....	.....	111
August	25	11	93,834	10,061	24	6	97,329	6,939	3	175	8	....	.....	77
September	41	9	120,260	7,512	18	4	65,763	6,540	16	1,600	2	....	.....	90
October	31	17	102,431	15,142	21	16	98,601	32,125	15	1,200	7	....	.....	117
November	27	21	98,016	20,272	16	10	78,824	19,823	16	1,000	2	....	.....	92
December	33	12	98,631	10,262	9	8	37,952	13,020	15	200	2	....	.....	79
1909.														
January	34	19	98,671	17,766	12	4	56,093	4,432	....	.....	7	....	.....	76
February	26	32	69,850	15,104	21	11	90,253	35,229	....	.....	4	....	.....	73
March	44	30	135,789	24,324	24	9	106,893	19,042	....	.....	2	....	.....	109
April	67	42	179,482	32,620	31	6	127,376	9,195	11	350	4	8	12,086	169
May	64	27	192,230	22,958	31	6	123,467	9,009	....	.....	21	18	25,707	167
June	79	24	232,779	21,183	32	7	134,466	20,096	....	.....	7	18	18,013	167
July	60	21	155,884	16,831	35	5	145,033	8,354	....	.....	7	10	11,083	137
August	88	21	272,545	17,124	37	8	170,227	19,660	3	415	13	15	18,691	183
September	48	23	162,832	17,303	30	3	119,846	1,988	....	.....	6	5	7,349	115
October	54	30	163,430	29,789	30	7	125,912	10,391	....	.....	9	....	.....	130
November	40	16	143,227	13,965	20	8	84,832	10,531	....	.....	6	....	.....	90
December	40	26	121,430	25,717	15	6	67,158	11,841	....	.....	6	....	.....	93
1910.														
January	39	35	100,855	32,189	19	1	86,476	2,550	2	.....	6	....	.....	102
February	58	19	168,101	15,859	12	6	52,924	11,741	1	250	6	....	.....	102
March	58	41	168,912	28,893	20	4	89,452	5,246	1	260	2	....	.....	121
April	63	50	177,176	40,166	27	6	86,251	7,245	4	1,559	2	5	5,578	157
May	71	36	190,179	28,925	34	2	156,920	1,248	....	.....	....	11	12,880	154
June	87	40	275,316	27,912	46	8	239,591	13,282	1	150	14	18	20,115	214
Total	1,226	612	.....	.....	588	159	.....	.....	96	.....	150	108	.....	....

From this table it appears that from 3 to 7 vessels pass the entrance to the Straits each day and that the smaller of these figures represents the average vessel movement during the winter months when weather conditions are most severe.

The Merchants Exchange of Seattle keeps in close touch with the movement of all vessels in the Pacific Northwest, and its records show an average of 5 vessels passing Neah Bay each day with an average tonnage of 2,000. Comparison with the commercial statistics published in Capt. Taylor's survey report of 1899 shows a material increase in the amount of commerce passing Neah Bay, but a decrease in the number of sailing vessels. The number of sailing vessels, foreign and domestic, entered and cleared in the two fiscal years 1896 and 1897 was 912. The number of such vessels reported as passing Tatoosh Island in the two fiscal years 1909 and 1910 was 771. The actual decrease is considerably greater than the above figures indicate for the reason that the statistics of 1896 and 1897 do not include all the vessels passing Tatoosh Island, but only those destined to or from American ports, while the statistics for 1909 and 1910 include sailing vessels to and from British Columbia ports.

Previous reports on the question of creating a harbor of refuge near the entrance to the Straits contain lists of wrecks occurring in that vicinity between 1874 and 1897. To complete the record the following tabular statement, prepared by the General Superintendent of the United States Life-Saving Service, is presented:

Digitized by Google

Disasters (strandings) to vessels near Cape Flattery from July 1, 1897, to June 30, 1910, as shown by the records of the Life-Saving Service.

Vessel.	Rig.	Flag.	Date of disaster.	Where from and where bound.	Locality of disaster.	Extent of loss.
Matilda	Bark	American	Aug. 19, 1897	Honolulu to Port Townsend	Tatoosh Island	Total.
Washtenaw	Steamship	do	Jan. 1, 1899	San Francisco to Tacoma	Pillar Point	Partial.
Do	do	do	Sept. 26, 1901	Tacoma, Wash., to Oakland, Cal	Duncan Rock	Do.
Mackinaw	Schooner	do	Oct. 16, 1901	San Francisco to Tacoma	Duncan Rock Shoal	Do.
Elwah	Scow	do	Sept. 1, 1902	Port Angeles to Elwah River	Angeles Point	Total.
Leelanaw	Schooner	do	May 5, 1903	San Francisco to Tacoma	Tatoosh Reef	Partial.
Garland	Steamer	do	June 24, 1903	Port Crescent to Port Angeles, Wash	Angeles Point	Do.
Tanner	Brig	do	Oct. 24, 1903	San Diego, Cal., to Port Angeles, Wash	do	Do.
Morning Star	Gasoline sloop	do	Nov. 10, 1903	Seattle to Ozette, Wash	Sekon Point	Total.
Alma	Schooner	do	Apr. 12, 1904	Port Angeles to Cape Flattery fishing grounds	Neah Bay	Do.
Valencia	Steamship	do	Jan. 22, 1906	San Francisco to Seattle	Vancouver Islands	Do.
Santa Ana	Steamer	do	Oct. 3, 1906	Seattle to Valdez, Alaska	Clallam Bay	Partial.
Skagit	Barkentine	do	Oct. 25, 1906	San Francisco to Port Gamble, Wash	Clo-oose, near Vancouver Island	Total.
Alice Gertrude	Steamship	do	Jan. 11, 1907	Returning to East Clallam	Clallam Bay	Do.
Spokane	Steamer	do	Feb. 10, 1907	Victoria, British Columbia, to San Francisco	Duncan Rock	Partial.
Winslow	Schooner	do	July 28, 1907	San Francisco to Winslow, Wash	do	Do.
Hecla	Bark	do	Aug. 10, 1907	San Pedro to Port Townsend	do	Do.
Uncle Jim	Gasoline steamer	do	Oc . 4, 1907	Returning to Port Angeles	Clallam Bay	Do.
Wyadda	Steamer	do	Oct. 24, 1908	Port Gamble to sea	Pillar Point	Unknown.
A. M. Baxter	Scow	do	do	Port Gamble to San Francisco	do	None.
Soquel	do	do	Jan. 22, 1909	Callao, Peru, to Port Townsend	Sea Bird Island	Total.
Pearl	Gasoline launch	do	Feb. 20, 1910	Neah Bay to Port Angeles	Kydaka Point	None.
Edith	Gasoline schooner	do	May 8, 1910	Seattle to Cape Flattery fishing banks	Waaddah Island	Total.
Dorothy	Gasoline launch	do	Aug. 3, 1910	Fishing around Cape Flattery	Neah Bay	Unknown.
Horner	Steamer	do	Aug. 7, 1910	Puget Sound to San Francisco	Waaddah Island	Do.
Waaddah	Gasoline launch	do	Aug. 17, 1910	Fishing	15 miles NW. of Cape Flattery	Do.
Watson	Steamer	do	Sept. 1, 1910	Seattle to San Francisco	Waaddah Island	Partial.
Standard No. 2	Gasoline schooner	do	Sept. 24, 1910	Fishing	15 miles NW. of Cape Flattery	Unknown.

Digitized by Google

The two wrecks in Neah Bay, and possibly the three wrecks at Clallam Bay, could have been avoided with a harbor of refuge at Neah Bay, but it is not evident that such a harbor would have prevented any of the other wrecks listed. One of the wrecks in Clallam Bay, that of the steamer *Alice Gertrude*, is described by Capt. Kalstrom as follows:

On the evening of January 11, 1907, when within sight of the lights at Neah Bay, with a strong wind blowing, my chief engineer reported that one of the steam connections in the engine room was leaking. Had there been a safe anchorage in Neah Bay I could have run my ship in there and in half an hour been in perfect safety. As it was, I was compelled to put about and seek anchorage farther up the Straits. When about opposite Clallam Bay, a blinding snowstorm having come up in the meantime, my ship was driven on the rocks and became a total wreck.

Another disaster (not included in the above list), which would apparently have been avoided with a harbor of refuge at Neah Bay, is described as follows by one of the advocates of this project:

A few years ago a bark, the *Cowlitz*, anchored in Neah Bay, when a storm came up and her tug attempted to tow her back to Clallam Bay. As she arrived opposite this bay her hawsers parted and she was carried out to sea and nothing heard from her afterwards.

The list includes a number of wrecks on Waaddah Island, nearly all of which (certainly the two in 1910) were due to the lack of a foghorn and suitable lights at the end of the island.

Vessels approaching the coast in time of severe storm, particularly sailing vessels, have difficulty in entering the Straits and frequently put back to sea. Such vessels, if they succeeded in entering the Straits, would not (unless disabled) attempt to gain refuge in Neah Bay, as there is no reason why they should not proceed to their destinations.

The benefit to incoming vessels that would result from increased protection at this point would be in the greater certainty of finding a tug in waiting and the assurance of a protected harbor close at hand in case they became disabled. To outgoing sailing vessels a harbor of refuge would be a great convenience during the winter months, as they could be towed to Neah Bay on an ebb tide and then await favorable conditions before putting to sea. Sudden changes in the weather now make it necessary at times for such vessels after arriving at the entrance to run back to Clallam Bay or Port Angeles for shelter.

As a waiting port for outgoing vessels a well-protected harbor at Neah Bay is less necessary than it was 12 years ago, as steam vessels have increased in size, the number of sailing vessels has decreased, the weather signals on the straits are more numerous, and the wireless telegraph prevents interruption of communication between Tatoosh Island and points inland.

A harbor of refuge in this vicinity is advocated by all the navigation interests on Puget Sound and by the leading commercial organizations of the principal cities situated on its waters.

Port Angeles, situated on the Strait of Juan de Fuca, 65 miles east of Neah Bay, alone dissents from this view, its commercial club alleging:

(1) That there is no necessaity for a harbor of refuge at Neah Bay.

(2) That even were such a harbor desirable, it is impracticable to construct and maintain the breakwater required to create it.

Digitized by Google

(3) That it would be impossible for vessels to enter such a harbor during a westerly gale, as it would be necessary to bring them broadside to the storm.

(4) That Port Angeles, with its large and safe anchorage, can accommodate all vessels that require protection.

Neah Bay is the rendezvous for a large number of fishing boats which operate outside of the straits. Some of these vessels are schooners of several hundred tons burden, but the large part of them are gasoline boats of 15 tons each, carrying 8 men to a boat. At times they are driven out of the bay and compelled to seek shelter at Clallam or Port Angeles, though they often find shelter in coves or in the lee of Waaddah Island.

A thoroughly protected harbor would be a great convenience to these boats, and it is not improbable that when the Government Indian and military reservations surrounding Neah Bay are thrown open to settlement this industry will so increase as to warrant in itself some additional protection. In other words, a harbor of refuge at Neah Bay would also serve as a fishing harbor, similar to those built in recent years on the coast of Scotland. It would also serve for the development of local commerce, and logs now rafted from points near Neah Bay to points on Puget Sound would be cut into timber on the shores of Neah Bay.

Neah Bay in its present condition serves a very useful purpose, as the following list of vessels which sought shelter in it will show:

Number and class of vessels that anchored at Neah Bay during the year 1909.

Months.	Steam vessels.	Sail vessels.	Tugs.	Barges.	Government vessels.	Total.
January	2	11			4	17
February	5	23	1	1	3	33
March	2	12			3	17
April	1	10		2	1	14
May		1	3	2	2	[illegible]
June	2	5		4	3	14
July				4		4
August		3		1		4
September	1	2			1	4
October	1	3			2	6
November		7	1			[illegible]
December	3	12			1	16
Total	17	89	5	14	20	145

It is true that occasionally such vessels in Neah Bay are compelled to weigh anchor and seek better shelter farther east, but this they have nearly always succeeded in doing, as there is no record of any vessels having been driven on the beach in Neah Bay, except one or two small fishing schooners.

Even without a breakwater, Neah Bay would be used considerably more than it is if additional aids to navigation were provided. The whistling buoy off Waaddah Island and the small light on it have not been sufficient to prevent several vessels from being wrecked at this point, and it is the general belief of navigators that a larger light on Waaddah Island and range lights as a guide into the harbor would greatly increase its usefulness.

Digitized by Google

When the life-saving tug *Snohomish* was assigned to duty in the Strait of Juan de Fuca several years ago, it was proposed to establish for her use a coal and supply depot on Waaddah Island, and contract was let for a pile wharf. Underlying rock made it impossible to drive piles and the station was established at Port Angeles instead.

This failure to build a pile wharf on a rock bottom at Waaddah Island has been construed by advocates of a breakwater to mean that it is impossible to maintain a supply wharf in Neah Bay unless additional protection is provided. This is not believed to be true. Pile launching ways have been maintained at the life-saving station for several years without damage. A wharf is maintained in Clallam Bay and a wharf on the beach in Neah Bay would be but little more exposed than a wharf at Clallam Bay. There is none there now, because the local commerce is not sufficient to justify the construction of a heavy substantial wharf as it would have to be.

As to the violence of wave action in Neah Bay during storms, the captain of the *Snohomish*, who has been there practically all winter, states that at no time was it so rough that the *Snohomish* could not have remained at anchor. Commercial boats, which are not so strongly built, might not have been equally successful. Furthermore, conditions this winter are said to have been unusually good.

Concerning the need of a harbor of refuge at Neah Bay, the following expressions of opinion are of value:

Capt. J. H. Quinan, United States Revenue-Cutter Service, now assistant inspector United States Life-Saving Service, Portland, Oreg., states:

> As to the establishment of a harbor of refuge at Neah Bay, I am a firm believer that it should be done. It would be a boon for shipping, especially vessels outward bound, as the nearest harbor of any account is Port Angeles, 50 miles away. The holding ground at Neah Bay is good, and what is needed is protection from the westerly gales and consequent swell. I feel competent to express myself, as I have anchored in the harbor a number of times, and while I was there in command of the U. S. Revenue Cutter *Tahoma*, having relieved the *Snohomish* for a short period.

On the other hand, Capt. T. J. Haake, United States Revenue-Cutter Service, in command of the life-saving tug *Snohomish*, a vessel which has spent practically its entire time at Neah Bay during the past winter, stated in response to a direct question that in his judgment the benefits that would result from the creation of a harbor of refuge at Neah Bay would not be sufficient to warrant the expenditure.

The advantages of a harbor of refuge at Neah Bay may be summarized as follows:

(1) It would form a waiting port for the convenience of outgoing sailing vessels and barges.

(2) It would form a haven for vessels disabled off Cape Flattery—admittedly a dangerous point.

(3) It would be of great advantage to the fishing fleet which operates outside the entrance.

(4) With the throwing open to settlement of the Government Indian and military reservations surrounding Neah Bay, considerable local commerce would develop if the harbor were protected.

The number of sailing vessels in use on these waters is steadily decreasing and there is every prospect that the decline will continue. This decline is not offset as on the Atlantic coast by a corresponding increase in barge traffic. Five or six sailing vessels were converted

Digitized by Google

into barges a few years ago for the purpose of conveying rock from Puget Sound to Grays Harbor to be used in construction of the North Jetty, and the Standard Oil Co. operates two oil barges between California and Puget Sound.

With only a limited barge traffic in existence or in prospect, with only 771 sailing vessels passing Neah Bay in the last two years (an average of one every other day outbound), and with the reasonable certainty of a further decrease in this class of vessels, I am of the opinion that the advantages which outgoing sailing vessels and barges would derive from being able to wait at all times in Neah Bay instead of Port Angeles are not sufficient to justify the construction of a harbor of refuge, designed primarily as a waiting port. Considered as a haven for disabled vessels, such a harbor would undoubtedly be of value, but a study of the wreck statistics does not indicate that the saving to commerce would be commensurate with the investment.

When the country immediately surrounding Neah Bay is thrown open to settlement, some artificial protection to this harbor will be desirable for the safety of the commerce which will follow the building of sawmills and fish canneries on Neah Bay, but no such local development is in prospect.

In view of the above, the conclusion is reached that the creation of a harbor of refuge at Neah Bay, Wash., or at such other point in the vicinity thereof as will best subserve the interests of commerce and navigation, is a work not worthy of being undertaken by the United States at the present time. It is urgently recommended, however, that a fog signal and larger light on Waaddah Island and range lights leading into Neah Bay be provided in order that full use may be made of the shelter to be found there throughout the greater part of the year.

Very respectfully,

C. W. KUTZ,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., May 10, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

In my opinion a harbor of refuge at Neah Bay is desirable if it could be constructed at a reasonable cost. In the report of the survey of Neah Bay submitted by the district officer and forwarded to the Secretary of War on January 20, 1900, the cost of the necessary breakwater was given as $1,111,907.50. The division engineer recommended more ample anchoring ground, which would bring the estimated cost to $1,873,154. Consideration of the unit prices assumed in these estimates would indicate that it is not likely better prices could be obtained to-day, and, in view of the general increase in cost of labor, the cost might be greater.

Digitized by Google

It is not thought that the benefit to commerce or navigation would warrant this large cost and the conclusions of the present district officer are approved.

JOHN BIDDLE,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 5, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This inquiry has in view the improvement of Neah Bay or such other point in the vicinity thereof as will best subserve the interests of commerce and navigation. Neah Bay is located about 5 miles east of the outer entrance to San Juan de Fuca Straits. Experience in this vicinity has shown that the locality is dangerous to navigation. Clallam Bay, 15 miles east of Neah Bay, is the only other point in the vicinity worthy of any consideration as a harbor of refuge, but it is not as well adapted for this purpose as Neah Bay, and the district officer states that if a harbor of refuge is to be established in this vicinity it should be at Neah Bay. At Port Angeles, 56 miles from the entrance to the straits, there is a natural harbor of refuge, but on account of the distance from the entrance it does not meet all requirements. Neah Bay has been examined and surveyed under former direction of Congress, and estimates already submitted indicate that the establishment of a suitable harbor of refuge would cost not less than $1,000,000, and probably nearer $2,000,000.

The commerce passing this locality is large and important, as indicated by the data given within. While this commerce has increased materially during the past 10 or 12 years, it is notable that the number of sailing vessels, which are the class in greatest need of a harbor of refuge, has decreased. The number of wrecks occurring in the vicinity of the entrance to the straits since 1897 is reported as 28, of which number the district officer states 5 might have been avoided had there been a protected harbor at Neah Bay. It appears that a number of these wrecks were due to the lack of sufficient effective aids to navigation. These have been improved in recent years, however, and the district officer urgently recommends that additional aids be established in the vicinity of Neah Bay.

The greatest value of a harbor of refuge at this locality would be to outgoing sailing vessels, as it would give an opportunity for them to lie near the entrance to the straits and wait for favorable weather conditions before putting to sea. Incoming vessels would not have much need for the harbor unless disabled, in which event it would be of value. The harbor would be of advantage to a number of fishing vessels which operate outside the straits, and in the opinion of the district officer the fishing industry may increase with the future developments and opening up of the country adjacent to Neah Bay to such an extent as to warrant some protection in itself.

The harbor serves a useful purpose in its present condition, as indicated by the table giving the number of vessels seeking shelter in 1909, from which it appears that 145 vessels anchored there, of

Digitized by Google

which number 89 were sailing vessels. It is stated within that the harbor of refuge would be used to a greater extent if additional aids to navigation were installed.

While a harbor of refuge at this locality would undoubtedly be of value, the board believes, from the facts and information now before it, that the cost of such a harbor would be excessive when compared with resulting benefits, and therefore it concurs in the opinion of the district officer and the division engineer that at the present time it is not advisable for the General Government to undertake the improvement of Neah Bay or other point in the vicinity thereof with a view to the establishment of a harbor of refuge.

In response to the district officer's notification of his unfavorable report a number of communications from commercial organizations at the principal towns on Puget Sound, advocating the improvement, have been received and given consideration. In compliance with law, the board reports that there are not questions of terminal facilities, water power, or other subjects that have any material bearing on the improvement under consideration.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF RAILWAY AND MARINE NEWS, A PAPER PUBLISHED IN SEATTLE, WASH.

SEATTLE, *December 17, 1910.*

GENTLEMEN: Having made a thorough and extended study of the needs of a harbor of refuge at Neah Bay, Wash., at the entrance of the Straits of Juan de Fuca, we desire to most emphatically indorse this plan as absolutely necessary for the protection of a large percentage of the constantly increasing commerce passing in and out of Puget Sound. We desire to place on record, in connection with the petition of Puget Sound shipping and business men, our indorsement of that petition asking for a reconsideration of the Neah Bay project. We are familiar with what data has been collected for your information and we believe that it will prove the need of this improvement and the unanimity of opinion among practical men as to the value which it will be to shipping interests.

We believe that the report of Capt. Harry Taylor on this matter, rendered some 10 years ago, thoroughly explains conditions as they are to-day. The only change is that within the last decade the amount of shipping passing in and out of the straits has increased greatly, particularly the fishing fleet, which would benefit in a large degree by the establishment of a harbor of refuge such as is suggested.

At the recent hearing held by the local engineer officer, the Neah Bay project was taken up the same afternoon as were two or three other purely local improvements. Consequently, the Neah Bay improvement appeared to have a local interest, and for this reason it did not receive the attention that it deserved nor the indorsement that otherwise would have come from other ports on Puget Sound.

Very frequently the weather off this coast is so boisterous and dangerous that even large ships are unable to put to sea. Frequently they anchor in Neah Bay, although that is anything but a safe place for them, as it is greatly exposed to the sweep of the ocean and the southerly winds which prevail in winter. Sometimes conditions are so severe that vessels for a week or more are unable to pass out to sea. The record showing the amount of tonnage which is thus compelled to seek anchor in Neah Bay is incomplete, as during the worst weather the telegraph wires from the weather stations are down, fog frequently obstructs the view of the observers, and the observers do not report the smaller fishing vessels which pass in and out constantly. Therefore Neah Bay in its present exposed condition is a rendevous for a much larger fleet than the figures show, and were the harbor of refuge built there is no question that it would be of the greatest benefit to shipping and would undoubtedly save a great deal of valuable shipping property and probably many lives.

Digitized by Google

It is probably known to your honorable board that the U. S. life saving tug *Snohomish* is unable to lie at anchor at Neah Bay in heavy weather, at which time her services are needed more than any other time close to the entrance of the straits, where she can render aid to distressed shipping with the least delay. With a harbor of refuge she could make Neah Bay her permanent headquarters and thus be of the greatest service to the maritime interests of these waters. The necessity of a harbor of refuge is also emphasized by the experiences of the life saving-station at this point, where, as is well known, it has been impossible to maintain wharfs and ways, owing to the great swell in the bay.

Owing to the great importance of this matter, the rapidly increasing importance of Puget Sound commerce, and the concensus of opinion among shipping men as to the need of the improvement, we trust that you will give this matter your full and fair consideration, believing that it should be referred back for further examination and a report thereon. Trusting that you will be able to grant the requests made by Puget Sound shipping men, to which we heartily subscribe, we beg to remain,

Yours, very truly,

RAILWAY AND MARINE NEWS,
Per ROBERT C. HILL, *Marine Editor.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF PORT ANGELES COMMERCIAL CLUB.

PORT ANGELES, WASH., *December 24, 1910.*

GENTLEMEN: As stated in our telegram of the 21st instant, we protest against the construction of a breakwater at Neah Bay as an unjustifiable expenditure of public funds. Clallam Bay, within 15 miles east of Neah Bay, has good holding ground, is fairly well protected, and is large enough to accommodate all shipping that may seek refuge in stormy weather, without any expenditure of public funds.

Further, we are morally certain that a breakwater such as is proposed for Neah Bay, from Waddah Island westerly to a point on the mainland, can not be constructed so that it will maintain its position one stormy season. The bottom of that part of the straits is of smooth rock and dips sharply toward the main body of the straits, northerly; hence there is nothing to hold any dumped rock in place, and the enormous waves that sweep into Neah Bay would soon distribute the rubble rock over the bottom of the Straits of Fuca.

To prove our contention we wish to cite a case where private capitalists attempted to construct a breakwater at Port Crescent some years ago. This place is 50 miles farther up the straits than Neah Bay and not nearly as much exposed to the heavy ocean swell as that place. This work was in charge of practical, competent engineers and they had all the latest improved machinery and hoists with which to handle the enormous rocks which were dumped into Crescent Bay. They had tunneled under a mountain of rock and placed a schooner load of powder in the tunnel and the blast had broken up the rock so that they could get any size that was possible to handle with the heavy cranes and hoists, and for two years everything went lovely with the breakwater; but one night in the month of December a fair-sized storm came up and lo and behold there was no breakwater next morning, no sign of it nor any sign of where it had gone, and to-day the regular passenger steamers which trade up and down the straits pass immediately over the place where the breakwater stood. We repeat, we see no reason or need for building a breakwater at Neah Bay, for the reason as already stated—Clallam Bay is within 15 miles of Neah Bay, with good holding ground and large enough to accommodate all shipping that may desire to seek refuge.

All along the strait we have Government signal stations at which colored flags are flown in daylight and colored lights are burned at night. These stations are maintained at Port Angeles, Port Crescent, Clallam Bay, Neah Bay, and Tatoosh Island. Shipping see these signals all along the line. With the signal stations above enumerated to look to for information no vessel has any excuse for passing Port Angeles or Clallam Bay at the farthest, in threatening weather, and when it is safe for a vessel to make the entrance to the Strait of Fuca it is very easy for them to make some of the natural harbors farther up the strait.

With reference to the necessity of a breakwater on account of the life-saving station, which is located at Neah Bay, and the life-saving tug *Snohomish*, which is stationed there, we beg to state: The life-saving station is now located on the mainland under the lee of Waddah Island, and is in first-class working order at the present time without any additional expense to the Government. The *Snohomish* is a vessel built to stand

Digitized by Google

any weather, with ground tackle capable of holding her anywhere she can get bottom, and in case of heavy blows she can always find a lee under Waddah Island, as there is a channel all around this island.

The necessity of a dock for coaling purposes for the tug *Snohomish* has been entirely eliminated by the Government building a fine dock with coal bunkers at Port Angeles for the use of that vessel, and since the *Snohomish* is equipped with wireless equipment, which is always in connection with the wireless at Tatoosh Island, there seems to be no real reason why she should lay at that place at all times.

There are a great many thousand passengers who cross the strait from Seattle to Vancouver and Victoria each year, as well as the thousands who cross on their way to Alaska. These thousands of passengers deserve some protection, as the loss of life at the time of the sinking of the *Clallam* would prove (the *Clallam* sank about 15 miles east of Port Angeles). The recent accident which happened to the Alaska liner *Northwestern*, which was driven ashore about 20 miles east of Port Angeles, is another proof of this. If the *Snohomish* had been at or near Port Angeles at the time of the loss of the *Clallam* there would have been no need of any loss of life, as the vessel drifted at the mercy of the waves for hours, and the people on the shore had knowledge of its condition. There are many other wrecks and accidents which could be referred to, but we only mention the most recent.

The *Snohomish* should have a cruising ground between Neah Bay and Port Angeles, where her coal bunkers are located, so as to give the greatest amount of protection to the greatest number of people.

If it were possible to construct a breakwater that would maintain its position at Neah Bay, it would be suicidal for any ship to attempt to make the harbor under such weather conditions as sometimes prevail in and about Neah Bay, as when the wind is blowing 40 to 60 miles an hour no master of any vessel in his right mind would attempt to bring his ship broadside to the storm to make Neah Bay. Thus in bad weather no ship could be taken in or out of Neah Bay, and in good weather there would be no need of a harbor of refuge at that point.

Please note section 4 of the protest, appeal, and petition against Capt. Arthur Williams's unfavorable report. It starts out with "The country around and tributary to Neah Bay is rich in timber and agricultural resources," etc. Pray what connection has the timber and agricultural resources with a harbor of refuge at Neah Bay?

Please read carefully the next paragraph: "This improvement would benefit not only the commerce of Puget Sound but the commerce of the entire Pacific coast. At the present writing there is no harbor north of San Francisco Bay, in our 900 miles of coast line, in which vessels can seek shelter in storm, unless they enter the Straits of Fuca and pass through their entire length to the main body of Puget Sound." What malicious falsehood; Port Angeles Harbor is considered one of the best harbors in the world. It has been so declared by many shipmasters and shipmasters in general. You will find proof to that effect by looking up the reports filed with the Navy Department at Washington, D. C., made by many United States admirals, who have visited Port Angeles Harbor with their ships, and also by reference to the Government charts.

Port Angeles Harbor has the best of holding ground—no shoals or rocks. Sailing vessels may sail in or out without the assistance of tugboats.

About 10 years ago this same breakwater scheme was planned by a railway company and urged on under cover of the Seattle Chamber of Commerce. Just the same scheme is at present being foisted upon the public by the attempt of the Chamber of Commerce of Seattle to have the unfavorable report of Capt. Williams set aside. Doubtless you have the resolution on file in your office adopted by the Seattle Chamber of Commerce February 16, 1909, at the recommendation of the Hon. Thomas Burke, chairman of the committee on national affairs, a member of that chamber of commerce, and an old employee (attorney) of the Hill system of railways.

Another private interest is at work in this breakwater scheme at Neah Bay. The Northwestern Contract Co., of Seattle, owners of Waldron Island quarry and numerous old ships that have been dismasted and are now used as barges under the name of the Alaska Barge Co., who are furnishing sand rock to the Government for the Grays Harbor Jetty, seem to be the chief promoters, as they are very active in having this protest and petition signed.

A photograph of a letter from that company, urging people to sign that petition, will go forward by mail under separate cover, addressed to "The Board of Engineers for Rivers and Harbors, 507 Colorado Building, Washington, D. C." It speaks for itself. Your honorable board will see who the people are that hope to be benefited by this attempt at constructing a breakwater at Neah Bay at public expense.

A number of different transportation companies have signed the protest and appeal, and these signatures will stand investigation. Some of them are practically out of

Digitized by Google

existence and several of the others are controlled by the parties who seem to be interested in securing a contract for the Northwestern Contract Co. to dump rock into the Pacific Ocean at Government expense.

We inclose two editorials on the breakwater subject which will show you what the local press think of the proposition.

In conclusion, gentlemen, we beg to say, like Chairman Burton (the Senator from Ohio) when he investigated this proposition some 10 years ago declared, we would deem the construction of a breakwater at Neah Bay "an unjustifiable expenditure of public funds."

Respectfully,

PORT ANGELES COMMERCIAL CLUB.
LEWIS LEVY, *President*.

P. S.—We are inclosing copy of protest and appeal so that you may have it at hand for reference.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

PROTEST, APPEAL, AND PETITION.

Board of Engineers for Rivers and Harbors, Washington, D. C.:

We hereby protest against the action of Capt. Arthur Williams, Corps of Engineers, United States Army, in reporting unfavorably on the proposed improvement at Neah Bay, Wash.

First. We protest because Capt. Williams was here only temporarily for four months and was not familiar with the importance, the urgent necessity, the great general benefit, and the interest felt in this work in all cities of Puget Sound.

Second. We protest because at the only meeting called for the purpose of hearing an expression from those interested in the execution of this improvement this matter was grouped with three items of purely local (Seattle) interest, and was taken up last after a long discussion of the other local matters and no one outside of the city of Seattle was heard on the subject. A matter of this importance and such general benefit to so large a district deserves a meeting by itself without the distraction of other topics and without the suggestion that it is being held in the interest of any one city.

In making this protest we do not question Capt. Williams's sincerity of purpose. It should be borne in mind, however, that he came to this station from the work on the Columbia River Jetty, and in the district tributary to Portland the intense jealousy of Puget Sound there prevalent affects involuntarily the opinions of the most unbiased.

We appeal from the unfavorable report of Capt. Williams's and in this connection state:

First. As to the present and prospective importance of the project and benefit to commerce likely to result from the proposed improvement, we refer to Capt. Harry Taylor's report embodied in House Document No. 337, Fifty-sixth Congress, first session, which is the best and most complete statement of the conditions demanding this improvement yet prepared. He says in transmitting this report:

"In my opinion there is no river and harbor work now in progress in this State, or contemplated, as far as my knowledge extends, which is of so much importance to the general commerce of the State as the construction of a harbor of refuge at Neah Bay."

Since Capt. Taylor's report was made the commerce of Puget Sound has grown steadily and rapidly until to-day it is one of the first four ports of the entire United States in the volume of its tonnage, and fully three-quarters of this total passes in and out of the Strait of Juan de Fuca and would be protected by this improvement. The port of Puget Sound has been for many years the first port in the United States in the volume of sailing tonnage. The lumber and wheat passing out of this port every year are carried in sailing vessels, which need the protection offered by this improvement even more than do steamers.

A further and very important branch of Puget Sound shipping which would benefit by this improvement is the fishing industry. Off the entrance of the Strait of Juan de Fuca and to the north and west an ever-increasing fleet of fishing vessels congregates. These small craft use Neah Bay as a rendezvous as much as weather conditions will permit. Each year sees its toll of lives lost and property destroyed for want of protection in this harbor.

Second. The present administration is on record repeatedly as favoring legislation beneficial to the American merchant marine. This being true the Neah Bay project should receive favorable consideration from any officer loyal to the administration, for the port of Puget Sound has been for years the only important American port where

Digitized by Google

the tonnage of American vessels exceeded the tonnage of foreign vessels. Any general improvement to the conditions here, therefore, is directly in favor of American shipping and in line with the administration's policy.

Third. The United States Government has appropriated from time to time funds for the maintenance of a life-saving station at Neah Bay. In connection therewith many attempts have been made to drive piles and maintain a wharf at this place without success, because of the fierceness of the seas and the strength of the tidal currents. With this improvement in place this life-saving station would be greatly facilitated in its work. Also, in 1908 the United States Government built and dispatched the life-saving tug *Snohomish* for this station, but without this improvement it is impossible to coal this tug at this point or to replenish other necessary supplies, and she is often compelled to leave there, sometimes even when most needed, for the purpose of obtaining these. With the construction of this improvement wharves, bunkers, and warehouses could be erected and this tug could be there the year round in readiness for any call.

Fourth. The country around and tributary to Neah Bay is rich in timber and agricultural resources, but only sparsely inhabited for want of transportation facilities. Much of this territory tributary to this bay is held in a Government reserve. The rugged mountain range occupying most of the Olympic Peninsula makes it doubtful if railroads will build to this point in many years. The country near Cape Flattery, therefore, will probably remain undeveloped until this improvement is constructed, because it is now impossible to maintain a wharf, and freight and passengers can only be handled to and from steamers entering this bay by means of small boats in calm weather. This improvement, therefore, would not only assist the interest of shipping and fisheries, but it would benefit the inhabitants of the entire region, and, further, it would add greatly to the value of the public domain.

This improvement would benefit not only the commerce of Puget Sound but the commerce of the entire Pacific coast. At the present writing there is no harbor north of San Francisco Bay in our 900 miles of coast line in which vessels can seek shelter in storm except they enter the Straits of Fuca and pass through their entire length to the main body of Puget Sound. Sailing vessels, barges, and often steamers destined for the Columbia River or Grays Harbor in bad weather are compelled to run for shelter to Puget Sound or San Francisco as indicated. With the improvement of Neah Bay at Cape Flattery a convenient protection would be offered to such vessels, saving them from 150 to 200 miles in the detour they are thus compelled to make in seeking shelter. As evidence of the conditions prevalent at this point we refer to the attached statement of wind velocity taken from the reports of the United States weather observer at Tatoosh Island, which is about 4 miles to the westward from this bay. This statement extends over the period from January 1, 1909, to July 1, 1910, and includes only those dates where the wind blew to exceed 25 miles an hour. These observations show 38 days on which the wind blew 40 miles an hour or more, 14 days when it blew 50 miles an hour or more, and 6 days when it blew 60 miles an hour or more.

We petition your honorable body to refer this matter back to Maj. C. W. Kutz, the officer regularly in charge in this district, to whom during the last two years many letters on this subject have been addressed and through whose hands two petitions to the Washington State delegation in Congress in its favor have passed.

We further petition that he be instructed to make a new survey and plan of the improvement and an estimate of cost based on present prices of labor and material.

The Manufacturers' Association of Seattle,
By A. F. McEwan, *President*.
International Steamship Co.,
The Inland Navigation Co.,
By Joshua Green, *President*.
The Puget Sound Navigation Co.,
By Frank E. Burns, *General Manager*.

(And 43 others.)

Digitized by Google

SEATTLE, WASH., *January 9, 1909.*

Hon. LEVI ANKENY,
S. H. PILES,
W. L. JONES,
F. W. CUSHMAN,
W. E. HUMPHREY,
Washington Delegation in Congress. Washington, D. C.

GENTLEMEN: Puget Sound is the foremost port on the Pacific coast. More vessels and of greater tonnage, both coastwise and foreign, pass the entrance to the Straits of Fuca than to any other body of water on this coast. Climatic conditions are such at Cape Flattery that at present inward-bound vessels are frequently delayed many days because of the absence of a harbor of refuge where seagoing tugs can pick them up and tow them to port. Outward-bound vessels are often compelled, on encountering a gale off the cape, to turn back and retrace their steps against an ebbing tide to Royal Roads or Port Angeles, a distance of 75 miles.

If a harbor of refuge is established near the cape, these risks and delays will be largely overcome and such disasters as have occurred in this vicinity in the past, with great loss of life and property, will be almost entirely avoided in the future; with the return of good weather after a storm, even damaged vessels could repair and proceed safely on their way.

Neah Bay, at Cape Flattery, is now an unprotected sheet of water just in the midst of the storm center. The tides rush back and forth through it, and the winds dash its surface into foam. In the entrance to this bay is Waddah Island. By building a breakwater from the western end of this island to the mainland a perfectly protected harbor could be created at a point where it would be of the most service to this vast commerce.

All this has been fully and exhaustively reported to Congress by Capt. Harry Taylor's report of the year 1900, on pages 4505 to 4511, where he recommended in the following terms the construction of a series of breakwaters at the northern entrance to Neah Bay, at an estimated cost of approximately $2,000,000, and the creation of a harbor of refuge for vessels caught in just such storms.

"The survey of Neah Bay shows that it is well adapted for conversion into a harbor of refuge. At a distance of about three-fourths of a mile from the inside of the bay a reef projects out from the western shore for a distance of about one-half mile. A breakwater constructed along this reef would have a solid foundation, would be in only a moderate depth of water and would protect an area of 94.4 acres having a depth of 30 feet or more, an area of 241 acres having a depth of 24 feet or more, and an area of 388 acres having a depth of 18 feet or more."

In his letter transmitting this report, he says:

"In my opinion, there is no river and harbor work now in progress in this State, or contemplated, as far as my knowledge extends, which is of so much importance to the general commerce of the State as the construction of a harbor of refuge as Neah Bay."

In forwarding Capt. Taylor's report, the division engineer, Col. S. M. Mansfield, says:

"The opinion of the district officer (Capt. Taylor) that the proposed improvement is a worthy one and is justified by the interests of commerce involved is concurred in."

After which he goes on to outline an improvement on Capt. Taylor's plans by which the area protected, as above set forth, can, he says, be "quite doubled" at a very little additional expense by constructing one long breakwater instead of three smaller ones, as Capt. Taylor recommended.

It is now eight years since Capt. Taylor made this report which Congress had called for, but as yet nothing has been attempted. In the meantime the foreign commerce from Puget Sound has increased phenomenally, as the figures for 1898 and 1908 will show, viz:

	Vessels.	Tons.
Entrances from foreign ports:		
For year ending June 30, 1898	1,725	1,045,701
For year ending June 30, 1908	2,455	1,799,603
Clearances for foreign ports:		
For year ending June 30, 1898	1,867	1,183,400
For year ending June 30, 1908	2,643	2,038,994

Accurate data regarding the domestic commerce from this port is not easily obtainable, but it is a well-known fact that the coastwise and Alaska commerce from this port has increased in a far greater degree even than the foreign.

Digitized by Google

A necessity exists for this purely national harbor of refuge, and we, the undersigned, earnestly petition you to lend your best efforts to obtain a substantial appropriation of, say, $500,000 at this session of Congress, with a provision that the local United States engineer enter into a contract for the completion or construction of breakwater at Neah Bay along the lines recommended by Col. S. M. Mansfield at a cost of (in round numbers) $2,000,000, in order that the work may be immediately started and completed within a reasonable time. Too many lives and too much property are exposed to these hazards without such a harbor of refuge located in this locality, and the emergency is too great to longer delay.

Respectfully, yours,

McCabe & Hamilton (Inc.),
By N. B. Jordon, *Vice President.*
The Washington Stevedore Co. (Inc.),
By E. A. Quigler.
Oregon & Washington Steam Navigation Co.,
By Chas. D. Scott, *Secretary and Treasurer.*
(And eleven others.)

Copies of Resolutions Favoring this Improvement Adopted by the Chambers of Commerce of Seattle, Bellingham, and Everett, in February, 1909.

Seattle, Wash., *February 16, 1909.*

The Honorable Chamber of Commerce of Seattle:

Gentlemen: Your committee on national affairs, to whom was referred the attached petition from the shipping concerns of Puget Sound, praying that a harbor of refuge be constructed by the Federal Government in Neah Bay, at the entrance of the Straits of Fuca, as outlined and recommended by the officials of the War Department in the year 1900, beg leave to recommend the adoption by this chamber of the following resolution upon said matter, to wit:

"*Resolved*, That the Chamber of Commerce of the city of Seattle strongly approves and urges the construction by the Federal Government of a harbor of refuge in Neah Bay at the entrance of the Straits of Fuca, as outlined and recommended to Congress in the year 1900 by the officials of the War Department, said plans and recommendations being based upon a thorough investigation by said officers of the need and of the feasibility of said improvement in the interest of Puget Sound and foreign commerce.

"*Resolved further*, That we commend to the consideration of the proper Federal officers the petition of a large number of shipping concerns engaged in foreign commerce, out of the port of Puget Sound, praying for the early construction of this proposed harbor of refuge in Neah Bay."

Respectfully submitted.

Thomas Burke, *Chairman.*

Adopted by the Seattle Chamber of Commerce February 16, 1909.

C. B. Yandell, *Secretary.*

RESOLUTIONS ADOPTED BY THE BELLINGHAM CHAMBER OF COMMERCE.

Whereas Puget Sound is the foremost port of the Pacific coast, accomodating more vessels than any other port on the Pacific; and

Whereas climatic conditions render the entrance to the Straits of Juan de Fuca extremely dangerous at times, as well as frequently causing loss of time to vessels because of rendering retreat to safe ports needful; and

Whereas a harbor of refuge near the entrance would save time, goods, ships, and lives, in case of stress or storm; and

Whereas an excellent location for such harbor, which could be successfully constructed and maintained, at comparatively small cost, is found at Neah Bay: Therefore, be it

Resolved by the Bellingham Chamber of Commerce, That the construction of such refuge is a necessity, and that the Federal Government be, and hereby is, respectfully petitioned to cause the same to be constructed.

Adopted this 20th day of February, 1909.

Bellingham Chamber of Commerce.
Loomis Baldrey, *Secretary.*

Digitized by Google

RESOLUTION ADOPTED BY EVERETT CHAMBER OF COMMERCE.

EVERETT, WASH., *February 27, 1909.*

Resolved, That the Chamber of Commerce of the city of Everett strongly approves and urges the construction by the Federal Government of a harbor of refuge in Neah Bay, at the entrance of the Straits of Fuca, as outlined and recommended to Congress in the year 1900 by the officials of the War Department, said plans and recommendation being based upon a thorough investigation by said officers of the need and of the feasibility of said improvement in the interest of Puget Sound and foreign commerce.

J. BRUCE GIBSON, *Vice President.*

Attest:
ELMER E. JOHNSTON, *Secretary.*

THREE LETTERS FAVORING THE IMPROVEMENT OF NEAH BAY.

[First: A circular addressed to the Washington State delegation in Congress.]

SEATTLE, WASH., *January 10, 1910.*

SIR: We wish you to refer to series of resolutions adopted during February, 1909, by the chambers of commerce of Seattle, Bellingham, and Everett, and a petition forwarded herewith to the Washington delegation in Congress (copies of which are attached), urging the necessity of an immediate appropriation of funds for the construction of the breakwaters to complete the harbor of refuge at Neah Bay, Wash., as recommended and reported on to Congress by Capt. Harry Taylor, in his report for the year 1900, to House of Representatives, Document No. 337, of the Fifty-sixth Congress, first session.

The life-saving tug *Snohomish*, which was built expressly for the Neah Bay station, finds it impracticable to lie at this point without protection which this improvement would furnish.

At the time of the *Materhorn* disaster a few weeks ago, the *Snohomish* was at Port Townsend, fully 100 miles away, and much of the time she lays at either that point or Port Angeles, 75 miles from Neah Bay. With the construction of this harbor of refuge, she would have a permanent berth in Neah Bay. All supplies would be delivered to her there, and she would be at all times in readiness to render aid whenever needed to the thousands of vessels passing out and in of the Straits of Fuca.

Do not overlook the fact that this is a great national undertaking, for in every year in its history Puget Sound has had the distinction, unique among all American ports, of having greater amount of American than of foreign tonnage employed in the commerce across the seas. How great that distinction is may be judged by the fact that, taking the country as a whole, American tonnage in foreign trade is less than 10 per cent of the total. In American sail tonnage Puget Sound is and has been the first American port; in American steam tonnage it is second only to New York; in total volume of sail tonnage in foreign trade New York again alone exceeds it, and, for that matter, Puget Sound is rapidly becoming the second port in the United States in the total volume of its tonnage.

The entrance to a port of this magnitude in northern waters and on a rough bleak coast must have all the protection possible as an insurance on the vast capital involved in the trade.

In the desire to reestablish the glory of the American merchant marine, the first step should be to protect what is to-day the greatest existing American fleet, namely, that passing each year by Neah Bay to the port of Puget Sound.

THE INLAND NAVIGATION CO.,
By JOSHUA GREEN.
PACIFIC TOW BOAT CO.,
By W. R. CHESLEY, *Manager.*
OREGON & WASHINGTON STEAM NAVIGATION CO.,
By CHAS. D. SCOTT, *Secretary and Treasurer.*
(And 10 others.)

[Second: A letter from a steamboat captain who has been operating vessels regularly into Neah Bay for the last 20 years.]

FEBRUARY 2, 1910.

SIR: I wish to call your attention to the benefits to be derived from the improvement of Neah Bay, Wash., by the construction of breakwaters, as laid out in the plans of Capt. Harry Taylor in his report for the year 1900, as amended and improved

Digitized by Google

upon by Col. Mansfield, at that time division engineer, United States Army. In the opinion of the writer, this bay offers the greatest opportunity for a harbor of refuge on the entire Pacific coast line of this country. With the completion of the improvement as outlined by Col. Mansfield, this would be the only bay on the Pacific Ocean in our 800 miles of coast line north of San Francisco into which vessels of all sizes could put and lie with perfect safety in any kind of weather. I give this as my opinion, after 20 years of experience as captain on the vessels of this company running into this bay.

As I understand it in Col. Mansfield's plan, the outer line of the breakwater would be at about right angles with the natural break of seas into this bay, and with its construction there would be no line of breakers to interfere with a vessel entering the bay in any storm. This is a very important benefit, not to be derived under the original plan of Capt. Taylor. At the present time it is impossible to lie with safety in this bay in any serious storm, as the swells strike a vessel broadside, causing her to roll dangerously. In my many years of experience on the run to the Cape I have found it very often too rough to land even in small boats. The condition there is such that at present it is impossible to maintain a wharf as a landing place for vessels. With the construction of this breakwater this bay would become a most popular anchorage ground for the vast commerce of this region, as there is an abundance of fresh water. Other supplies could be furnished vessels very economically, lying there, if the anchorage were made safe. As it is, this bay is in constant use whenever the weather permits. For example, on my last trip there were five ships at anchor there, among others, the *W. F. Babcock*, *Robt. Hein*, and the lighthouse tender *Mansanita*.

It is a matter of great regret that the United States life saving station at this bay should be so handicapped by the failure of the Government to construct this breakwater as to be of very little service in cases of emergency.

It has happened many times that vessels have been wrecked in the vicinity of Cape Flattery when this breakwater would have assured them perfect safety. As an illustration, a few years ago a bark, *Cowlitz*, anchored in Neah Bay, when a storm came up and her tug attempted to tow her back to Clallam Bay. As she arrived opposite this bay, her hauser parted and she was carried out to sea and nothing heard from her afterwards.

As a personal experience, I can tell you about the wreck of the steamer *Alice Gertrude*, of which I was captain. On the evening of January 11, 1907, when within sight of the lights of Neah Bay, with a strong wind blowing, my chief engineer reported that one of the steam connections in the engine room was leaking. Had there been safe anchorage in Neah Bay, I could have run my ship in there and in half an hour been in perfect safety. As it was, I was compelled to put about and seek anchorage farther up the straits. When about opposite East Clallam, a blinding snowstorm having come up in the meantime, my ship was driven on the rocks and became a total wreck.

The above are only two of many accidents which have occurred in this neighborhood, and it is the hope of every sea captain navigating the waters of the Straits of Fuca that this breakwater will be built and a first-class harbor of refuge established in this bay without delay. No improvement which you have before your office at this time will be of so much general benefit to the shipping of the Pacific Northwest.

Yours, respectfully,

KALSTROM,
Captain Steamer "Bellingham."

Approved:
PUGET SOUND NAVIGATION CO.,
By C. H. J. STOLTENBERG.

Maj. C. W. KUTZ, *Corps of Engineers.*

[Third. A statement at some length of the necessity for and benefits to be derived from this improvement by the Seattle head of the Great Northern Steamship Co.]

SEATTLE, WASH., *February 8, 1910.*

DEAR SIR: We note that there is considerable activity among the different shipping interests of the Northwest in their endeavor to again call our Government's attention to the necessity of establishing a harbor of refuge at Neah Bay, Wash.

The Great Northern Steamship Co., which I have the honor to represent as marine superintendent, has been requested to lend their aid in bringing this matter to the attention of Congress by submitting a report to the Engineering Corps, which will, in a simple way, illustrate the writer's knowledge of the Pacific coast, its shipping, and harbors.

During 1881 and 1882 the writer made monthly calls at Neah Bay to land supplies and from the above date to 1898 semimonthly trips from San Francisco to Puget

Digitized by Google

Sound. From San Francisco to Port Angeles on the Straits of Fuca there does not exist along the coast a safe harbor for a ship to anchor in, i. e., one that is protected from summer and winter gales. Coastwise shipping has no protection whatever after leaving San Francisco northbound and after Port Angeles southbound. It is of frequent occurrence that sailing vessels, both domestic and foreign, have towed to Cape Flattery, and after getting to the cape found the weather stormy, unfit to proceed to sea, which necessitated towing back to Clallam or to Port Angeles to await a more favorable opportunity to proceed on their voyage. We have known many instances when this performance has been repeated two or three times before the ship made her final departure. Had there been a harbor of refuge at Neah Bay much expense and annoyance to owners would have been obviated.

Small coastwise steamers many times go to the cape and find the weather bad, steam back into the straits, and wait for a favorable opportunity to pass out of the straits. If they had an anchorage like Neah Bay to go to, what a great saving to the owners could be effected.

Then, again, if the anchorage at Neah Bay was protected by a breakwater, it would be the means of better protection to vessels that trade regularly, and to the United States Government vessels that are stationed there for the purpose of protecting life and property. No vessel can lay at Neah Bay with any comfort during the southeast and southwest gales.

We are all familiar with the life-saving station that is now quartered on Waddah Island. It is a fact that it is not a safe place for a station in its present exposed condition. If the breakwater was built as recently planned, a protection would be guaranteed against all kinds of weather. With a sea wall established, wharves could be built where vessels of small tonnage could lie with safety. A coaling station could be placed there from which the United States cutters could replenish their fuel supply, also their fresh-water supply. At present these supplies are at least 120 miles up the sound, and it means a loss of from three to five days for a Government steamer to make the trip from Neah Bay to Seattle and return; and it has happened that their assistance was badly needed during their absence, and I contend that this condition should not exist during the winter months. A vessel should be in constant attendance at Neah Bay.

We have quite a fishing fleet operating off the cape, and it will increase each year. These little vessels are compelled to come into the straits when the weather is bad; sometimes they are compelled to seek a safe anchorage, and to do this they have to run up the straits 35 or 40 miles before an anchorage is reached. If Neah Bay had a protected harbor they would be 60 miles nearer their base of operations.

These are small items, but they are conclusive proof that a harbor is badly needed at the west entrance of the Straits of Fuca and at this time its commercial value is practically covered up.

Neah Bay is contiguous to the Quilleyute Valley, and if the transportation of supplies could be easily effected it would add to the value of the surrounding country very materially.

Government signal stations could be placed on the promontory and all the telegraphing, wireless and other lines, could be then made more effective. At the present the cable between the mainland and the Island of Tatoosh is out of commission a great deal of the time. Occasionally the rush of seas through the narrow channel separating Tatoosh Island from the mainland causes such a commotion that it is almost impossible to keep the telegraphic cable intact. Frequently our attention is called to a shipwreck or a disabled steamer in the vicinity of Cape Flattery. The loss of life has been exceedingly heavy from the various wrecks on the Vancouver shore, and it is the opinion of our practical seamen that if a life-saving steamer had been in close touch with the cape and its environments many lives could have been saved.

Our Government a few years ago responded to the call of our people for better protection of shipping in these waters. We got a steamer and a life-saving station. The life-saving station was placed on Waddah Island, but it has proven that when heavy gales prevail outside of the cape Waddah Island is not a safe place to launch a life-saving boat from. The same condition exists with the steamer that was built for the same purpose as the life-saving station, that of protection of life and property. As I have stated before, the steamer finds that the anchorage of Neah Bay is not a haven of safety in stormy weather, consequently she is forced to steam around the entrance to the straits until her fuel is gone, then there is nothing left for her to do but to steam back to Seattle or other ports up the straits to replenish her fuel supply; and it is usually the case that her services are seriously needed when she is away, and these conditions will continue until a coaling station is established at Neah Bay.

With the present existing conditions no coaling station is possible without a protecting wall to ward off the force of the heavy seas that come into the Straits during the stormy weather. Piers can not be built that will stand the rough usage that they would receive from the open sea.

Digitized by Google

In conclusion I will state that it is my opinion that there is no place on the Pacific coast from Mexico to Alaska where a harbor of refuge is so badly needed as at the entrance of the Straits of Fuca. Our shipping is increasing from year to year and it is natural to suppose that marine casualities will increase in like proportion. No one but the practical seamen can appreciate the importance of aids to navigation at the entrance of the Straits of Fuca.

We could make many suggestions of improvement in our help to navigators in these waters. There is no port in the world that is so badly neglected as is the port of Puget Sound, and you will agree with me that Puget Sound is second to none in the world's commerce.

Yours truly,

C. C. LACY,
Marine Superintendent.

Maj. C. W. KUTZ, *Corps of Engineers.*

LIST OF VESSELS SEEKING THE PROTECTION OF NEAH BAY AND OTHER POINTS IN THE IMMEDIATE VICINITY, AS REPORTED BY THE UNITED STATES WEATHER OBSERVER AT TATOOSH ISLAND DURING THE YEAR 1909.

[NOTE.—These observations are only made during the hours of daylight and are often handicapped by reason of fog and hazy weather. Further, on many occasions the wires break, making these reports impossible. It should be also borne in mind that the hundreds of fishing craft which would benefit by this improvement are entirely omitted from these reports.]

1909.

Jan. 1. Departed, cutter, *Manning*.
Jan. 2. Weather thick.
Jan. 4. Departed, schooner *Snow & Burgess*.
Jan. 5. Wires down.
Jan. 6. Wires down.
Jan. 7. Steamer *Bellingham* anchored until weather moderates.
Jan. 8. Anchored, steamers U. S. *Manning* and *Heather*.
Jan. 9. Anchored, steamers U. S. *Manning* and *Heather*.
Jan. 9. Anchored, steamers U. S. *Manning* and *Heather*.
Jan. 11. Departed, steamer U. S. *Manning;* arrived, s. schooner *Majestic*.
Jan. 14. Anchored, steamer *McArthur*.
Jan. 15. Anchored, bark *Sardana*, ship *Hovding;* cutter *Manning* sailed to scene of wreck of French ship *Alice;* arrived, four-mast schooner, unknown.
Jan. 17. Anchored, schooner *Oliver J. Olson* and *Camano* and U. S. *Manning*.
Jan. 18. Anchored, schooner *Oliver J. Olson* and *Camano* and U. S. *Manning*.
Jan. 19. Anchored, schooner *Oliver J. Olson* and *Camano* and U. S. *Manning*.
Jan. 19. Bark *Sardana* and *Hovding* and *McArthur* still at anchor.
Jan. 22. Departed, steamer *Camano*.
Jan. 23. Departed, ship *Hovding*, U. S. *Manning* with life-saving crew to scene of wreck of schooner near Sea Bird Rock; arrived, steamer *Meteor*.
Jan. 24. Arrived, U. S. *Manning* with survivors of wrecked schooner *Soquel* and captain's dead wife and child.
Jan. 25. Departed, bark *Sardana*, U. S. *Manning* with survivors and bodies of wrecked *Soquel*.
Jan. 27. Anchored, *Chas. E. Falk* and *Lyman D. Foster*.
Jan. 28. Departed, *Chas. E. Falk* and *Lyman D. Foster*.
Jan. 30. Anchored, ships *Ditton* and *Kymance*.
Feb. 1. Anchored, schooner *Spokane*.
Feb. 2. Anchored, barkentine *Good News* and schooner *Spokane*.
Feb. 2. Ships *Ditton* and *Kymance* still at anchor.
Feb. 3. Departed, barkentine *Good News* and schooner *Spokane*.
Feb. 3. Anchored, *Mary E. Foster*.
Feb. 4. Departed, *Mary E. Foster;* anchored, schooner *Ida May;* arrived and departed, steamer *Jupiter*.
Feb. 5. Arrived, schooner *Salem; Ditton* and *Kymance* still anchored, also *Willie R Hume*.
Feb. 6. *Ditton, Kymance, Willie R. Hume, Granada, Balboa*, and the Umatilla Reef Lightship anchored.
Feb. 7. Umatilla Reef Lightship departed.
Feb. 8. *Balboa* passed out; *Kymance, Willie R. Hume*, and *Granada* departed.
Feb. 8. Arrived, French bark *Champigny*.
Feb. 9. Departed, French bark *Champigny;* arrived, s. schooner *Chas. Nelson* and schooner *Crescent*.

Digitized by Google

1909.
Feb. 10. Arrived, steamer *Beckenham*.
Feb. 11. Ship *Ditton* departed; arrived and anchored, cutter *Manning*.
Feb. 12. *Manning* still anchored.
Feb. 13. *Manning* still at anchor.
Feb. 14. Arrived, schooner *Tiverton* and schooner *Alpena*.
Feb. 15. *Manning*, *Tiverton*, and *Alpena* still anchored; schooner *Snow & Burgess* and bark *Albert* arrived.
Feb. 16. *Jupiter* still at anchor.
Feb. 17. *Alpena* passes out; *Tiverton* departed; steamer *Maverick* arrived.
Feb. 18. Schooner *Oakland* arrived, also *McArthur*.
Feb. 19. Barkentine *Aurora* anchored.
Feb. 20. *Jupiter*, *Aurora*, and *McArthur* still anchored; *Aurora* departed.
Feb. 21. Departed, *Jupiter*.
Feb. 22. Arrived, steamer *Elsa*.
Feb. 23. Tug *Independent* with scow at anchor.
Feb. 24. Steamer *Selja* arrived.
Feb. 26. Ship *Elwell* anchored.
Feb. 28. Anchored, barkentine *Lanhiana*, bark *Carradale*; departed schooner *Stimson* bark *Carradale*, ship *Arranmore*. Later all these returned on account of weather.
Mar. 1. Above all anchored.
Mar. 2. *Arranmore* and *Carradale* departed.
Mar. 3. *Forrester* and *Lanhiana* at anchor.
Mar. 4. Schooner *Kona* arrived, also schooner *Chas. Nelson*.
Mar. 5. Barkentine *Lanhiana*, schooner *Forrester*, schooner *Alice Cook* departed, also schooner *Stimson*. *Manning* anchored.
Mar. 6. Arrived, *Endeavor*; *Manning* departed.
Mar. 7. Schooner *Camano* arrived.
Mar. 8. Arrived, schooner *O. M. Kellogg* and schooner *David Evans*.
Mar. 9. Departed, *David Evans*. Anchored schooner *Snow & Burgess*.
Mar. 10. Anchored, U. S. *Manning*.
Mar. 16. Anchored, bark *Albert*.
Mar. 17. Arrived, steamer *Hazel Dollar*; departed bark *Albert*.
Mar. 20. Arrived, Union Oil steamer *Roma*.
Mar. 21. Arrived, barkentine *John Smith*.
Mar. 22. Arrived, *Ruth E. Godfrey* schooner.
Mar. 23. Departed, *Ruth E. Godfrey*.
Mar. 25. Arrived, *Manning*.
Apr. 1. Arrived, schooner *Nokomis*, schooner *Bainbridge*; *Manning* anchored.
Apr. 2. Arrived, four-mast ship *Shorbek*.
Apr. 3. Arrived, ship *Marborough Hill*.
Apr. 4. Anchored, barge *James Drummond*. Arrived schooner *Nelson*.
Apr. 10. Anchored, schooner *Crescent*.
Apr. 13. Anchored, schooner *O. M. Kellogg*, schooner *Maid of Orleans*, barge *Carondelet*.
Apr. 14. Departed, barge *Carondelet*.
Apr. 15. Departed, *Maid of Orleans* and *O. M. Kellogg*.
Apr. 17. Arrived, barkentine *Chas. F. Croker*.
Apr. 20. Anchored, U. S. *Heather*.
Apr. 21. Arrived, steamer *St. Croix*.
Apr. 29. Arrived, schooner *Mahukuha*.
May 20. Anchored, U. S. *Heather* and *Snohomish*.
May 21. *Snohomish*, departed.
May 25. Anchored, yawl *Argo*.
May 28. Life-saving power boat *Audious* towed schooner *Godfrey*.
May 29. Anchored, barge *Carondelet*, tug *Grayling*.
May 30. Anchored, barge *Carondelet*; *Big Bonanza* and launch *Skiddo* in distress.
May 31. Departed, *Carondelet* and *Skiddo*.
June 1. Anchored, ship *Amphritite*.
June 5. Anchored, barge *St. James*.
June 6. Departed, barge *Big Bonanza*.
June 7. Departed, U. S. *Snohomish* for Seattle.
June 9. Arrived, s. schooners *Wasp* and *Rainier*.
June 10. Anchored, ship *Elwell*.
June 12. Arrived, ship *Tarpenbeck*.
June 14. Departed, ship *Elwell*.

Digitized by Google

1909.

June 17. Anchored, barge *James Drummond*.

June 20. Anchored, *James Drummond* and U. S. *Snohomish*. Arrived U. S. *Heather* and schooner *Robert R. Hind*.

June 23. Departed, barge *James Drummond*; anchored barge *Palmyra*, U. S. *Snohomish* and U. S. *Columbine*.

June 24. Arrived, schooner *R. W. Bartlett*; departed barge *Palmyra* and U. S. *Columbine*.

June 25. Arrived, U. S. *Snohomish*.

July 8. Anchored, barge *Big Bonanza*.

July 23. Anchored, barge *Hayden Brown*.

July 30. Arrived, barges *Palmyra* and *James Drummond*.

Aug. 10. Arrived, barkentine *James Johnson*, s. schooner *Thos. L. Wand*.

Aug. 13. Arrived, schooner *Fred J. Wood*.

Aug. 30. Arrived, barge *Big Bonanza*.

Sept. 4. Departed, barge *Big Bonanza*; steamer *Cape Finnisterre* anchored on account of weather.

Sept. 5. Departed, steamer *Cape Finnisterre*.

Sept. 12. Arrived, barkentine *Retriever*.

Sept. 21. Anchored, U. S. *Heather*.

Sept. 25. Departed, U. S. *Heather*.

Sept. 28. Arrived, schooner *A. F. Coats*.

Oct. 3. Arrived, schooner *Susie Plummer*.

Oct. 15. Arrived, schooner *Forest Home*, s. schooner *Olson & Mahoney*.

Oct. 18. Arrived, schooner *Robert R. Hind*.

Oct. 26. Arrived, U. S. *Manning*.

Oct. 28. Arrived, U. S. *Columbine*.

Nov. 4. Arrived, gasoline launch *Kenewick*.

Nov. 9. Arrived, schooner *Boralis*.

Nov. 12. Anchored, barkentine *Makiweli* and schooner *Forest Home*.

Nov. 13. Departed, *Makiweli*.

Nov. 18. Anchored, schooner *Balboa*.

Nov. 25. Anchored, *Lottie Bennet*, *Nokomis*, *Balboa*, and *Genevieve*.

Nov. 27. Departed, *Nokomis*, *Lottie Bennet*, and *Balboa*.

Nov. 30. Wires down.

Dec. 1. *Nokomis*, *Lottie Bennet*, *Expansion*, and *Genevieve* compelled to return and anchor.

Dec. 2. Departed, *Nokomis*, *Lottie Bennet*, and *Genevieve*. Quillayute Indians report wreckage 6 miles north of Quillayute River.

Dec. 3. Capt. Olson, Umatilla lightship, arrived with eight members of crew of ship *Matterhorn*, which foundered 70 miles southwest of lightship; three lives lost.

Dec. 5. Arrived, U. S. *Snohomish* from Port Townsend, where she was at the time of the wreck.

Dec. 9. Wires down. Later anchored, steamer *Tiverton* and schooner *Honopui*.

Dec. 11. Arrived, schooner *Ethel Zane*.

Dec. 12. Anchored, *Camano*, *Georgian*, *Honopui*; departed, *Ethel Zane*.

Dec. 13. Arrived, s. schooner *Fairhaven*, bark *Olympic*, barkentine *Veneta*, and *Alice McDonald*.

Dec. 14. Sailed, schooner *Honopui*, *Camano*, *Alice McDonald*, *Olympic*, *Georgiana*.

Dec. 18. Arrived, s. schooner *Shasta*.

Dec. 22. Schooner *Susie Plummer* is in distress and abandoned 60 miles west by south of Cape Flattery.

Dec. 23. Steamer *Minnesota* reports passing derelict latitude 49° 20′ north, longitude 128° 30′ west. Dismasted and waterlogged; no signs of life.

1910.

Jan. 1. Wires down.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 480.

LITTLE KANAWHA RIVER, W. VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF LITTLE KANAWHA RIVER, W. VA., WITH A VIEW TO THE MODIFICATION OF THE EXISTING SYSTEM OF LOCKS AND DAMS AND ITS FURTHER IMPROVEMENT.

JANUARY 25, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, January 24, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 19th instant, together with copies of reports from Capt. (now Maj.) F. W. Altstaetter, Corps of Engineers, dated June 8, 1909, and January 31, 1910, with maps, on preliminary examination and survey, respectively, of Little Kanawha River, W. Va., also copy of a supplemental report dated May 23, 1911, made by him in compliance with the provisions of the river and harbor act approved March 3, 1909.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 19, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated June 8, 1909, and January 31, 1910, with maps by Capt. (now Maj.) F. W. Altstaetter, Corps of Engineers, on preliminary examination and survey, respectively, called for by the

Digitized by Google

river and harbor act approved March 3, 1909, of Little Kanawha River, W. Va., with a view to the modification of the existing system of locks and dams and its further improvement, together with a supplemental survey report dated May 23, 1911.

The five existing locks and dams in the Little Kanawha River extend 4-foot navigation to Creston, 48 miles above the mouth; the upper one was constructed by the United States under authority of the act of June 14, 1880, and the lower four were purchased under authority of the act of March 3, 1905, from the Little Kanawha Navigation Co. In the accompanying reports consideration has been given to a project for obtaining a navigable depth of 6 feet up to Burnsville, 74½ miles above Creston, on the assumption that further slackwater improvement, if undertaken on this river, should provide for the economical transportation of coal.

The standard Ohio River coal barge is 26 feet wide and about 135 feet long. The existing locks, Nos. 1 to 4, are 23 feet wide with an available length of 125 feet; No. 5 is 26 feet wide and 125 feet long. As they are too small for coal traffic, the district officer proposes their removal and the construction of 15 new concrete locks and fixed concrete dams with lifts of not more than 12½ feet, which will provide a 6-foot depth up to Burnsville. The dimensions of the four locks proposed by him below Creston are 54 feet by 280 feet; above this point on account of the narrow river a width of 28 feet is proposed. The estimated cost of this improvement is $5,000,000, with $54,000 annually for maintenance.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, which has held public hearings at its offices in this city and in Parkersburg, W. Va., and has made an inspection of portions of the river. Upon the board's request, the district officer submitted a supplemental report, dated May 23, 1911, in which consideration is given to improvements of lesser magnitude. He estimates that by retaining the five existing locks and dams, omitting Nos. 14 and 15, and by replacing Nos. 6–13, as originally proposed, by six dams of higher lift, the cost could be reduced to $1,702,968, including $274,690 for reservoirs; and if replaced by seven dams, to $1,860,940, similarly including $221,616 for reservoirs. The locks proposed are 28 feet by 140 feet in available dimensions.

From the reports it will be seen that the most economical plan for slack-watering this stream to the coal fields will cost about one and a half million dollars, and there will then be available in the lower portion of the river only a 4-foot navigation through locks of such restricted size that a large traffic can not be expected to result. After carefully considering this subject in all its phases, the board states that:

> It is satisfied of the existence of large quantities of coal in the upper section of this river. It does not believe, however, that there would be any prospect of getting this coal out by water with anything less than a complete new system of transportation, at a cost of, approximately, four to five million dollars. It would be practicable to secure light-draft navigation by the modified plan suggested, at a cost of about $1,500,000, but this would be of little value and, in the opinion of the board, would not result in benefits at all commensurate with the cost. The board is forced, therefore, to concur in the opinion of the division engineer that the Little Kanawha River is not worthy of further improvement at the present time.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer,

Digitized by Google

and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Little Kanawha River, W. Va., with a view to the modification of the existing system of locks and dams, and its further improvement, is not deemed advisable at the present time.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF LITTLE KANAWHA RIVER, W. VA.

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., June 8, 1909.

SIR: In compliance with instructions contained in letter from office of the Chief of Engineers, dated March 8, 1909, and in letter dated March 12, 1909, I have the honor to submit the following report on the preliminary examination of the Little Kanawha River:

A report of an examination of this river by Col. W. E. Merrill, Corps of Engineers, United States Army, is to be found in the Annual Report of the Chief of Engineers, 1875, page 740; a report by Maj. D. W. Lockwood, Corps of Engineers, United States Army, Annual Report of the Chief of Engineers, 1895, page 2520; a report by Capt. W. E. Craighill, Corps of Engineers, United States Army, Annual Report of the Chief of Engineers, 1904, page 2598; and a report by Capt. F. C. Boggs, Corps of Engineers, United States Army, on a survey for proposed Lock and Dam No. 6, Little Kanawha River, published in House Document No. 917, Sixtieth Congress, first session.

This river has been in local charge of Wm. M. Hall, assistant engineer, since 1902, during which period he has studied the river quite carefully. Before entering the Government service he was employed seven years by the Norfolk & Western Railroad Co. (which company, I believe, transports all the Pocahontas coal to market), during a large part of which time he spent in the Pocahontas coal field in charge of extending railroad tracks to new mines, etc. He is, therefore, quite conversant with the Little Kanawha River as well as with the matter of coal transportation, which is of importance in discussing the necessity for the improvement of this river.

The following is taken from a report made by Mr. Hall to this office:

Geographical position.—The Little Kanawha River lies entirely within the State of West Virginia. It rises on the western slope of Laurel Hill (one of the principal ranges of the Appalachian Mountain system), flows across Braxton, Gilmer, Calhoun, Wirt, and Wood Counties, and empties into the Ohio River at Parkersburg, 184 miles by river from Pittsburgh. The general course of the river from its source to its mouth is very direct, and is about 28° north of west. The entire length of the river is about 158 miles; the distance from Burnsville to the mouth * * * is 120½ miles.

Examination.—During a very low stage of water, from November 18 to 22, 1902, I made a trip along the river from the Government lock (No. 5) near Burning Springs to Burnsville, a distance of 80 miles. I rode along the banks of the river nearly all the way, and was thereby able to see the bed of the river, the nature of its banks, the valleys, hills, cultivated fields, residences and other buildings, the villages and towns, and the coal openings, stone, timber, and other natural resources. Since that exami-

Digitized by Google

nation I have made two other similar trips along the same part of the river, and many trips over the river between Lock No. 5 and Parkersburg. From April 22 to 24, 1909, I visited and went into five of the principal coal mines, within 2 miles of the river, in which is being mined the Pittsburgh vein of coal. The principal towns and villages on the river are Burnsville, where it is crossed by a branch of the Baltimore & Ohio Railroad, and which is the present head of boat navigation; Sand Fork, at the mouth of a creek by that name, on which there is a large oil development; Glenville, the county seat of Gilmer County; Granstville, the county seat of Calhoun County, Brooksville, at the mouth of Yellow Creek, on which there are numerous oil wells, Creston, at the mouth of the West Fork of Little Kanawha River, and about 1 mile below the head of slack-water navigation; Burning Springs, where the first oil well in West Virginia was drilled, about 49 years ago; Elizabeth, the county seat of Wirt County; and Parkersburg, at the mouth, which, with its suburbs, now has a population of about 24,000.

Physical characteristics.—The Little Kanawha Valley is about 80 miles long, has an average width between north and south watershed lines of about 32 miles, the extreme width being about 55 miles. The bottom lands along the river, which range from 100 feet or less to 2,000 feet in width, are quite fertile. There are said to be many good farms on the hills back from the river, but much of the land is rough and mountainous, with narrow valleys, containing rapidly flowing creeks. The river itself, from Burnsville to the head of Pool No. 5, is a succession of short ripples and pools, the former rarely exceeding 600 feet in length and the latter rarely exceeding a half mile in length.

A list of the ripples with their local names, distances from the mouth, and other characteristics is given in the Annual Report of the Chief of Engineers for 1875, part 1, page 745.

By far the worst place in the river and the greatest obstruction to navigation is May Bros.' milldam at Stouts Mills, about 112 miles above the mouth. It is 4 feet high and is now a complete barrier to boats. All merchandise and other freight carried on that part of the river have to be transferred over the dam.

The bars forming the ripples consist mainly of boulders, gravel, and a little clay and sand, and in several places exposed ledge. There are but few places where sand is found in large quantities, and shifting sand bars are unknown in this river.

The banks are high and firm, and they give good footing for large trees and undergrowth.

* * * * * * *

There is but little trouble from caving banks, or from whole trees, roots and all, going into the river, as occur on many of our rivers. It is a remarkable fact that the Little Kanawha Navigation Co. never had a snag boat in either of its pools and that snagging operations never were among its expenses.

The five locks and dams now in operation are mainly founded on solid rock ledge. Although the rock does not ordinarily appear in the bed of the upper river, I am of the opinion that the sand and gravel covering it is usually of slight depth.

Some of the bends in the river are rather sharp, but there is testimony from boat captains and pilots to the effect that, with sufficient depth of water, they can bring out on each trip with a towboat from Glenville from six to eight barges laden with 500 tons each. At ordinary boating stage the river is about 400 feet wide at the mouth and 150 feet wide at Gilmer, at the mouth of Copen Creek. The Little Kanawha has a good depth at its mouth in the natural state; even at low water there has never been any trouble in entering or departing from it into the Ohio.

* * * * * * *

Discharge and volume of water.—So far as I am informed, no gaugings of this river have been attempted except for the purpose of obtaining the low-water discharge. It is well known that, with the exception of seasons of such low water, there will be an abundance of water for navigation with well-built fixed dams and locks.

Mr. Carpenter, in his report of 1874, writes on this subject as follows:

"I made a few rough gaugings with the following results: At Bull River shoals (about 78 miles above the mouth) the flow was 12.58 cubic feet per second, or water sufficient for about 21 lockages, allowing for leakage about 25 per cent of the whole amount."

He evidently means sufficient water for 21 lockages per day by the navigation company locks. From other information received, I believe his gaugings were at an extremely low stage, and that a large part of the discharge was passing through the sand and gravel bar which formed the bed of the river at the place where the gauging was made.

At Lock No. 4, about 32 miles above the mouth, during the last 10 days of October, 1908, at one of the lowest stages of water ever known to the present generation and at

Digitized by Google

a time when the Ohio River in this vicinity was about 7 inches lower than any former record shows, I had four gaugings of the discharge at that point made by Lock Master James Burton. These gaugings were very carefully taken after special preparations were made for measuring in the lock chamber the volume of the discharge. At that point it is believed that we have works practically impervious and that all of the discharge was diverted through the lock chamber. The average of the four gaugings was 527 gallons per second, or 70.5 cubic feet.

From this gauging, and knowing that such a stage of water rarely occurs, it is believed that with locks and dams built so as to be impervious there will ordinarily be sufficient water for navigation purposes.

* * * * * * *

Past improvements.—Natural oil having been discovered at Burning Springs in 1860, the development of which produced a considerable amount of traffic from that point to the mouth of the river, the Little Kanawha Navigation Co. was formed and commenced the improvement of the river by four locks and dams in 1867 and completed the structures in December, 1874, thereby extending slack water several miles above Burning Springs. The chambers of these four locks are 143 feet long between quoins and 23 feet wide.

In 1878 the first appropriation was made by Congress for extending navigation by slack water and in 1884 the actual construction of Lock No. 5 was commenced. That lock and dam was completed in December, 1891, since which time it has been in successful operation. The lock is of sufficient size for passing a boat about 26 feet wide and 125 feet long. This lock and dam extended slack water a short distance above Creston, which is at the mouth of the West Fork of the Little Kanawha River, about 48 miles above Parkersburg. Since the completion of that lock and dam there has been a project in force for the improvement of the river by removing bowlders, overhanging trees, snags, drift, and other obstructions, for which small appropriations have been made from time to time.

Under an act of Congress of March 3, 1905, the Government acquired on November 1, 1905, possession of all the property of the Little Kanawha Navigation Co., including Locks and Dams Nos. 1 to 4, inclusive, by the payment of $75,000.

The same act appropriated $83,000 for repairing those locks. On March 2, 1907, $79,500 was appropriated for improvements. These proposed repairs and improvements are now in progress.

Present commerce.—The commerce on this river is divided into two separate parts—that originating at Burnsville and stopping above Lock No. 5, and that on the lower part of the river between Glenville and Parkersburg. Data concerning the latter can be obtained with reasonable accuracy from the reports of the lock masters.

The commerce passing each of the locks during the calendar year 1908 was as follows:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Tons of freight	47,573	59,078	53,546	54,009	49,707
Passengers	3,871	4,398	1,596	1,351	6,819

Navigation was practically suspended from September 1 to November 30, inclusive, in all the pools on account of repairs to several of the locks and dams and on account of clearing all the pools of snags and other obstructions.

During the same year the lockage reports give the following statistics of traffic:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Steamboats	554	587	462	457	1,483
Barges and flats	303	325	108	134	352
Rafts	1,531	1,523	1,250	1,288	1,193
Miscellaneous	98	65	258	225	288
Total	2,486	2,500	2,078	2,104	3,316
Number of lockages	1,470	2,096	1,769	1,749	3,316

The number of steamboats and gasoline boats plying the river was as follows: Steamboats, 5; gasoline boats, 33.

Digitized by Google

As stated above, there is quite a large amount of navigation on the upper part of the river which does not reach the locks. Some of it is timber, which is manufactured by the local sawmills, some merchandise, oil, and gas-well and pipe-line supplies, which traffic leaves the Baltimore & Ohio Railroad at Burnsville and is transported down the river on small flatboats into Gilmer and Calhoun Counties. The weight of such merchandise and supplies carried yearly on that part of the river is estimated at from 5,000 to 10,000 tons.

It will be seen from the above and other similar statistics given in late annual reports of the Chief of Engineers that the commerce on this river in its unimproved state is quite large; in fact, it is greater than that of many other streams which have received and are yet receiving large congressional appropriations for improvements; and, as will be seen below, the principal source of future commerce for the river is yet untouched.

Resources.—Nearly all if not the entire drainage basin of the Little Kanawha River is included in the great Appalachian coal field, which extends from Pennsylvania to Alabama. Some of the minerals of greatest economic worth peculiar to this region are well known and are now being mined in this valley. The principal resources known to exist in large and paying quantities other than those of an agricultural nature are timber, sandstone, limestone, brick clays, natural gas, oil, and the Freeport and Pittsburgh veins of coal, which vary from 5 to 8 feet in thickness. The industrial development of the mineral resources may be said to have just commenced, and it is probable that others may be discovered and put upon our markets as the development continues.

Timber.—The valley has been for many years a large producer of poplar, walnut, oak, hickory, and many less valuable timbers. Although the production of timber may fall off, the natural growth will make timber and its products a large source of commerce for many years.

Stone.—All along the river from Parkersburg to Burnsville there is a great abundance of coarse-grained sandstone of fair quality and suitable for buildings, bridges, coke ovens, and many other purposes as the valley develops. The masonry of the five locks already built on the river is of sandstone taken from quarries near the respective locks—some of them within a stone's throw of the quarries. In the Ohio, at the mouth of the Little Kanawha, there is abundance of sand and gravel suitable for concrete construction.

Limestone is said to be found at a level of several hundred feet below the river and extending from about 10 miles above Parkersburg to above Elizabeth, 25 or 30 miles. Its outcrop is from 1 to 2 miles back from the river.

Oil.—As stated above, the first oil well drilled in West Virginia was at Burning Springs in 1860, about one year only after the first oil was discovered in the United States near Titusville, Pa. There is now a large daily production at Burning Springs from probably 200 to 300 wells. There are also large productions of oil on Hughes River, Standing Stone Creek, Yellow Creek, Sand Fork, and on several of the other tributaries. The number of producing wells has been constantly increasing and will probably increase for years to come.

Gas.—In drilling for oil large quantities of gas have been found. It is piped to Pittsburgh, Parkersburg, and several intermediate towns, and is used for light, heat, and power, and in the manufacture of iron and steel.

At Grantsville is located the Cabot carbon factory, which is said to have a capacity of about 5,000 pounds of marketable carbon a day.

Coal.—In the upper part of the valley there are two great veins of coal outcropping on the hillside on each side of the river, the Pittsburg vein and the Freeport vein. These are the same two well-known veins of coal and carry the same names as on the Monongahela River and in that vicinity. The Pittsburg vein outcrops on the hillsides on each side of the river from about Glenville to near Burnsville, a distance of about 16 miles, except about 3 miles in the vicinity of Sand Fork, where it lies under the bed of the river. The Freeport vein outcrops near Bulltown, several miles above Burnsville. At and below Burnsville down to Glenville it lies below water underneath the Pittsburg vein.

Mr. S. D. Brady, mining engineer, lately employed by the State of West Virginia in the preparation of a map of West Virginia, showing its mines and mineral resources, says there are 60,000 acres of merchantable Pittsburg coal vein, and 40,000 acres of the Freeport vein. I understand that he means that there are those areas of each of the veins above water in this territory which can be mined by drifting. In addition there are several thousand acres of the Pittsburg vein below water, which can be mined by shallow shafts.

During April 22-24, inclusive, 1909, I visited this coal field and inspected five of the principal coal mines within a mile of the river. I personally measured the thick-

Digitized by Google

ness of the coal in each of the mines, examined the character of the roofs, and not only questioned the owners and superintendents of the mines but also the miners who were digging the coal.

There is, at the extreme upper end of the Pittsburgh vein, two mines shipping by the Coal & Coke Railroad, which has been recently completed. Near the middle of the field there are two small mines making shipments by flatboats. The two railroad mines have reasonably fair facilities for mining and loading coal on cars. The two mines shipping by boat have extremely poor facilities. The shipments by boat have only commenced within the past year, and under existing river conditions can never supply more than the local consumption on the Little Kanawha River.

I submit herewith a map,[1] marked "A," of this coal field indicating location of the mines where I measured the thickness of the coal on the visit referred to above, and the location of the outcrop openings measured by Mr. S. D. Brady, mining engineer, in 1902.

The following tabulated statement indicates the structure of the coal at the 56 points where measured by Mr. Brady, with serial numbers corresponding to the same numbers on map:

Serial No.	Character of roof.	Thickness of coal.		Character of floor	Remarks.
		Ft.	*in.*		
1	Fire clay.....	3	6	Fire clay....	No parting.
2	.....do.....	7	2½	.....do.....	No parting except bone.
3	.....do.....	4	4½	.....do.....	Do.
4	Black slate....	3	4	.....do.....	No parting.
5	Slaty fire clay.	5	½	.....do.....	No parting except bone.
6	Fire clay.....	5	6	.....do.....	No parting.
7	.....do.....	4	2	.....do.....	Do.
8	.....do.....	7	1	.....	No parting except bone.
9	.....do.....	6	6½	.....	Do.
10	.....do.....	6	1	Fire clay....	Do.
12	.....do.....	6	½	.....	Do.
13	.....do.....	5	10	Fire clay....	Do.
15	.....do.....	3	2	.....do.....	No parting.
18	Sand rock clay	4	4	.....do.....	Do.
19	Fire clay.....	3	6	.....do.....	Do.
20	.....do.....	3	0	.....do.....	Do.
21	.....do.....	3	6	.....do.....	Do.
22	.....do.....	4	0	.....do.....	Do.
23	.....do.....	6	11	.....	No parting except bone.
24	.....do.....	7	3	Fire clay....	Do.
25 (1)	.....do.....	4	3	.....do.....	Do.
25 (2)	.....do.....	6	6	.....do.....	Parting slate, 1 inch; sulphur, 1 inch.
26 (1)	.....do.....	4	4	.....do.....	No parting except bone.
26 (2)	.....do.....	5	4	.....do.....	Do.
27	.....do.....	6	0	.....do.....	Do.
28	.....do.....	8	4	.....do.....	Opening, 11 feet 5 inches; parting, fire clay, 2 feet 7 inches; bone, 6 inches.
29 (1)	.....do.....	9	0	.....	Opening, 9 feet 4 inches; slate 4 inches underlying.
29 (2)	.....	8	7	Fire clay....	No parting except bone.
30	Fire clay.....	6	2	.....do.....	Do.
31	Sand rock.....	5	6	.....do.....	Do.
32	Fire clay.....	5	6	.....do.....	Do.
33	.....do.....	6	0	.....do.....	Do.
34	.....do.....	5	0	.....do.....	Do.
39	.....do.....	6	2	.....do.....	Do.
41	.....do.....	5	5	.....do.....	Do.
42	.....do.....	6	0	.....do.....	Do.
43	.....do.....	6	11½	.....do.....	Do.
44	.....do.....	5	6½	.....do.....	Do.
45	.....do.....	6	7	.....do.....	Do.
46	Slaty coal.....	5	11½	.....do.....	Do.
47	Fire clay.....	7	3	.....do.....	Do.
48	.....do.....	7	0	.....do.....	Do.
49	.....do.....	5	11	.....do.....	Do.
51	.....do.....	7	1	.....do.....	Do.
52	.....do.....	7	4	.....do.....	Do.
53	.....do.....	7	4	.....do.....	Do.
54	.....do.....	4	6	.....do.....	Do.
55	.....	2	6	.....do.....	Do.
56	Fire clay.....	8	0	.....do.....	Do.

[1] Not printed.

Digitized by Google

The following statement indicates the structure of the coal where measured by the writer April 22-24, 1909:

Owner of mine.	Serial No.	Character of roof.	Thickness of coal.	Character of floor.	Remarks.
			Ft. in.		
Cosmopolitan Coal & Coke Co.	(a)....	Fire clay..	7 3	Slate or soapstone.	Measurement, 200 feet ± from portal, 50 feet ± above water in river. Shipping by rail.
J. R. Lynch.....	(b)....	Soapstone.	6 4	Slate floor...	Measurement, 125 feet ± from portal; 60 feet ± above water in river. Mining for neighborhood use.
C. G. Hays.....	(c)....	...do.....	7 3	Slate.....	Measured 200 feet ± from portal.
Do.....	(c)....	...do.....	6 5	.....do.....	Measured 200 feet ± from portal Rooms 16 feet wide, without props.
J. F. Noll.....	(d)....	...do.....	6 9	.....do.....	Measured 125 feet ± from portal 250 feet ± above water. Shipping by boat.
C. F. Whiting.....	(e)....	Soapstone or fire clay.	6 1	.....do.....	Measured 160 feet ± from portal 50 feet ± above water. Mining for local trade.

It should be specially noted in examination of all of these measurements that the bone reported is a coal of sufficiently good quality to be suitable for all commercial purposes except blacksmithing. With this knowledge it is seen that the Pittsburgh vein in this field ranges from 5 to 8½ feet in thickness without a parting requiring separation.

When we consider the great expense of separating the parting which holds throughout the Pocahontas coal vein and throughout most of our other best coals this is a fact of very great importance in considering the possibilities of the Little Kanawha field.

It is believed that there are many thousand acres of the Freeport vein below water which may be mined by shafting to a depth not exceeding 100 to 300 feet.

It is a well-known fact that from each foot of thickness for each acre of coal about 1,000 short tons can be shipped, or for each of these Pittsburgh and Freeport veins from 5,000 to 8,000 tons an acre. To be conservative, we will assume the smaller quantity. From the above-named report, as well as from inquiry, I believe there are at least 50,000 acres of Pittsburgh coal tributary to the river, and when shafting is resorted to there may be found an even larger area of the Freeport vein.

In order to be conservative, should we suppose that only 40,000 acres of each of these coals, the Pittsburgh and Freeport, may be moved by water, and that it would go out at the rate of 16,000 tons a day (equal to 500 carloads, or thirty-two 500-ton barge loads). At that rate it would require nearly 100 years to move such quantity.

It should be borne in mind that by hauling the coal to the river from 5 to 15 miles on mine cars, as is now being done in other fields, the above figures may be doubled or trebled.

As is well known, coal from the Pittsburgh and Freeport veins has been mined on the Monongahela River and in the Fairmont and Clarksburg districts for many years, and is considered among the best bituminous coal for domestic, steam, and coking purposes in the States of West Virginia and Pennsylvania, or in the world.

Within the past two years the Coal & Coke Railroad has been extended into the extreme upper end of this coal field near Burnsville, and a few mines have already been opened which are now making shipments by it.

As indicated above, during the past year small shipments have been made by flatboats, on high stages of water, to Glenville, Grantsville, Elizabeth, and other intermediate points along the Little Kanawha River. All of these shipments are from the Pittsburgh vein.

All the reports which I have received, in reference to the quality of the coal, indicate that it is equal to or slightly better than the coal mined from the same vein on the Monongahela River and in the Fairmont district for most of the purposes of ordinary use.

The superintendent of the Cosmopolitan Coal & Coke Co. gave the writer an analysis of that company's coal, now being shipped, as given below.

The following analyses of samples marked 100, 101, 102, and 103 are of outcrop samples taken from localities indicated as given in report by Mr. S. D. Brady, referred to above.

Digitized by Google

The analysis of Fairmont or Monongah coal is an average of 51 samples, page 214, Volume II, 1903, Coal Report, West Virginia. Geological Survey, Dr. I. C. White, State geologist.

Mine or location.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Phosphorus.
Cosmopolitan Coal & Coke Co	.....	42.85	49.87	7.28	1.87	0.012
(100) Near Vadis	1.01	40.99	48.34	9.66	3.289	.0306
(101) On Bear Run	1.16	40.74	50.60	7.50	1.770	.0096
(102) Big Ellis Creek	1.00	40.51	50.40	8.09	2.717	.0061
(103) Copen Run	1.30	41.41	50.39	6.90	1.750	.0045
Average Fairmont	1.43	37.47	53.83	7.27	2.59	.....

Messrs. Marshall & Co., Fairmont, W. Va., sales agents, write under date of May 10, 1909, of the Cosmopolitan Coal & Coke Co.'s production as follows:

"Replying to your inquiry of the 3d, relative to coal lying on the Little Kanawha River.

"1. The coal we are taking is being used for steam and domestic purposes, and for both purposes is extremely high grade, and valuable.

"2. This coal, in our judgment, for the above purposes is better than Fairmont and Monongahela River fields, and for steam purposes not quite so good as Pocohontas or New River, but for domestic purposes better than the latter.

"3. We use the Cosmopolitan coal, as well as that from the Davis mines in that section, for the simple reason that it is the best coal for the above purposes we can secure on the Fairmont rate of freight."

I am reliably informed that where the Little Kanawha coal which is being shipped by boat comes in competition with the coals from the Monongahela and Ohio Rivers that for domestic use the former, on account of superior quality, sells for about 25 cents a ton more than the latter.

Mr. Brady, in his report on the Pittsburgh vein of the Little Kanawha, writes as follows:

"The pavement and roof are fire clay, and will, in my opinion, add to the cost of mining to some extent, especially when the pillars are drawn, as the pavement will heave, but on the other hand the soft pavement will assist in disposing with the drainage both by absorption and being easily excavated. This advantage will overcome the additional cost. There is a very persistent butt and face to this vein, and the coal is very hard and black. The hardness and the butt and face will cause the coal to be mined very lumpy, more so than the Fairmont coal.

"I have just finished taking samples of coal from all the mines in the State of West Virginia for Dr. White, the State geologist, and I consider this field to surpass them all as an export coal. Owing to the hardness of this coal, it will make a good machine coal and can be mined very cheaply, making very little slack."

Dr. White, in above-named volume, page 212, describes the Pittsburgh vein in the Fairmont or Monongah field, as follows:

"The Pittsburgh seam in this region has two persistent bands; the lower half consists of one-half to 1 inch of bone coal 4½ to 5 feet from the bottom of the seam. The second band is 6 to 8 inches above the lower bone. A third parting is occasionally present between the two mentioned. The coal immediately below the slate, and known as the top coal, is of an inferior quality and on average about 1 foot thick."

I was informed by the mine superintendents and also by the miners (during the trip referred to above, when visiting the mines in the month of April) that the miners received 45 and 50 cents a ton for mining the Pittsburgh vein, the same price that is paid in the Monongah or Fairmont fields for similar work. I was told by some of them that they had worked in the Monongah or Fairmont fields and that they consider the mining of the Little Kanawha coal easier than that near Fairmont.

* * * * * * *

From the above it appears that the Little Kanawha field contains a great quantity of coal which will require a century or more to mine; that in it the Pittsburgh vein attains its greatest perfection in quality; and that its structure is such as to render the cost of mining very reasonable when compared with the best fields of the State or United States.

Coke is one of the most valuable products of bituminous coal. It is mainly produced for commercial purposes from coal having a low percentage of volatile combustible matter and with a high percentage of fixed carbon; a low percentage of ash and sulphur is also desirable. Coke is used for many purposes, but its greatest use is for the manu-

Digitized by Google

facture of pig iron, and the manufacture of steel by the direct Bessemer process. The Pittsburgh coal is not a good coking coal, but the Freeport is first class for that purpose and is said to be second only to the Connellsville and Pocahontas, the greatest coking coals in the world.

The important reason for improving this river is to transport the coal which may be mined from these two great coal veins (the Pittsburgh and Freeport) and the coke by barges to the Ohio River. Such transportation is now enjoyed by only two coal fields in the Ohio Valley or by only two great soft-coal fields in the United States, the Monongahela River and the Kanawha River fields, although work has been done toward securing such transportation in one or two other cases. Out of the above two fields there is now transported by water some 13,000,000 tons of coal annually, and the price at which the river coal is sold greatly affects the price of all the coal marketed along the entire Ohio River and along the lower Mississippi to the Gulf. The effects of this river transportation are so great that I have known the retail price of coal in the interior of West Virginia, within 25 miles of the mines, to be $3 per ton, and, at the same time, in Cincinnati, 325 miles from the mines, to be $2 per ton delivered in the consumers' bins. It appears perfectly safe to assume that this river transportation reduces the price of all the coal sold on the Ohio and lower Mississippi by 50 cents a ton, and at times this reduction may be as much as $1 to $1.50. It also appears that there are annually consumed along the Ohio and lower Mississippi from 25,000,000 to 50,000,000 tons of coal. Therefore it is possible if not probable that by these two river improvements the consumers of coal are saved in that one commodity alone from $12,000,000 to $50,000,000 per year.

The statistics by the Department of the Interior give the production of coal for the United States in 1907 as 394,000,000 tons, ten times as great as in 1880.

The above is a map [1] of the upper part of the Ohio River watershed, indicating the location of the eight principal coal fields from which shipments are now being made, and indicating as number "9" the location of the Little Kanawha field.

As the main conditions to be considered of any coal field are the quality of the coal, the cost of mining and loading, and the cost of transportation to the consumers, it appears from all the information which I have obtained on the subject that if the Little Kanawha River be improved so as to provide water transportation for the coal this field will prove as valuable a national asset as the other great bituminous coal fields of the United States.

The improving of the Little Kanawha River, thereby adding a third field open to free water transportation, would no doubt further reduce the price of coal all along the Ohio and lower Mississippi.

Should this reduction average only 10 cents a ton, the annual saving to the consumers of coal would be from $2,500,000 to $5,000,000.

Treating this subject as an economic question, it should be borne in mind that the coal from these fields can be moved to the consumers by barges at about one-fifth the cost per ton-mile of movement by rail, and that, if this Little Kanawha coal is shipped by water instead of by rail, this great difference in cost between these two methods will be saved to the consumers and to the country.

In this connection it seems proper to consider the fact that a railway for shipment of this coal will cost many times as much to build, maintain, and equip as similar costs of the river improvement under consideration. For example, from personal knowledge, the writer is entirely satisfied that the Norfolk & Western Railroad has expended for grading, masonry, and roadway not less than $15,000,000 on its line from the Pocohontas field into the State of Ohio; and we hear from many printed reports that the Virginian Railway has recently spent $40,000,000 to build from the sea into an undeveloped coal field in the southeast corner of this State. Moreover, the shipping capacity of every railroad is very much limited, whereas the shipping capacity of the Ohio River is practically unlimited, or at least it is safe to say that the annual consumption of coal and iron by the entire world could be shipped down the Ohio River.

In 1896 a board of engineers made a report on the question of a 500-ton barge canal from Lake Erie to the Ohio River (see Annual Report, Chief of Engineers for 1896, p. 2975), and from that report the route from Cleveland to Marietta appears to be the best, and of the routes considered it is much the cheapest to construct. As is well known, the State of Ohio is now building this waterway for 5-foot navigation. When it is made suitable for 500-ton barges it is probable that coal from the Little Kanawha field can be placed in Cleveland and on Lake Erie at about $1.75 per ton, about two-thirds the present price in that region.

When this coal is opened and lines of communication are established to Lake Erie for the transportation of coal and lake ore to this part of the Ohio, it is probable that

[1] Not printed

Digitized by Google

the ore, the coke from the Little Kanawha, and the limestone near here will meet in furnaces on the banks of the Ohio, near the mouth of the Little Kanawha, and in the State of Ohio along the canal. At Pittsburgh, to make a ton of pig iron requires about 1.65 tons of lake ore, 950 pounds of limestone, and 2,100 pounds of coke. The ore is transported from Lake Superior, the limestone from central Pennsylvania, 150 miles, and the coke from 60 to 75 miles.

Here we have the limestone within 20 miles, the coking coal within 100 miles, and with the ore coming from the lakes by 500-ton barges further economy in pig-iron manufacture should be effected.

There is an insufficiency of data at hand as to the low-water discharge of the upper part of this stream, and it is impossible to get the data at this time. A low stage of the river will, in all probability, occur late in the summer or early in the fall, but it is possible, of course, that the river may not reach this year as low a stage as usual, and that it will be impossible to procure the data this year.

Even if the low-water discharge is found to be very small, it will only mean, in a canalized river, an interruption of navigation at infrequent intervals.

The Freeport coal vein is known to extend under the Pittsburgh coal vein as far downstream as Glenville. If the river is improved as far upstream as Copens Run, about 12 miles above Glenville, it will extend for 12 miles beyond the first outcropping of the Pittsburgh coal vein and for 12 miles through country where the Freeport coal can be mined by shafting. By the time Copens Run is reached the river is a rather small and tortuous stream.

In view of the foregoing I am of the opinion that the river is worthy of improvement by means of locks and fixed dams, and recommend that a survey be made at an estimated cost of $10,000. It is further believed that the upper limits of the improvement should for the present be somewhere in the vicinity of Copens Run; that the improvement should provide for 6-foot navigation; that the locks should have a chamber of between 300 and 360 feet in length and a width of about 55 feet; that Locks and Dams Nos. 1 to 5 should be rebuilt if the upper river is improved, so that they will afford the same navigation facilities; and that the dams should all be of concrete, as that construction allows less leakage than crib construction.

In connection with the special subjects to be investigated with all examinations and surveys called for by the river and harbor act approved March 3, 1909, it has been impracticable without delaying this report to submit any data herewith concerning the establishment of terminal and transfer facilities or concerning the development and utilization of water power for industrial and commercial purposes. It is thought that such data could be submitted with the report of the survey if made, or if no survey is made, a supplementary report covering those two subjects could be prepared. It is further believed that no special investigation is necessary for other subjects properly connected with this project.

Very respectfully,

F. W. ALTSTAETTER,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

Digitized by Google

[First indorsement.]

ENGINEER OFFICE, UNITED STATES ARMY,
CENTRAL DIVISION,
Cincinnati, Ohio, June 12, 1909.

Respectfully forwarded to the Chief of Engineers, United States Army.

The general improvement of the Little Kanawha River by a complete system of locks and fixed dams will depend upon:

(a) The commerce of the river, present and prospective, with special reference to undeveloped or partially developed mineral resources of the region traversed by the river.

(b) The low-water discharge of the river which will determine the feasibility of slack-water navigation.

(c) The outlet for the commerce of the river.

In regard to the commerce of the river (a), it is doubtful whether the present or prospective value of the timber, stone, oil, and gas would warrant the radical improvement of the river; in regard to coal deposits, however, the case is different. In a comparatively short time there will be a general opening up of the coal fields of this region, unless the same is artificially retarded by the owning interests. The fact of the presence of large deposits of coal appears fairly well established. To meet such a demand of commerce, naturally to be expected in the near future, some improvement of the river, adequate to the same, should be undertaken.

In regard to the low-water discharge of the river (b), the data are insufficient. A search was made for any results obtained by the Department of Hydrography of the United States Geological Survey, but no records of gauging or stream measurements seem to have been made or published. The slack-water improvement of the river will depend in great part upon the results of investigation of discharge of the river.

In regard to an outlet for the commerce of the river (c), such an outlet is practically assured. Dam No. 19, Ohio River, is under construction below the mouth of the Little Kanawha; Dam No. 18, Ohio River, is nearing completion some distance above. This will make the Little Kanawha enter the Ohio River at about the center of the pool between Dams 18 and 19. This is considered important in determining the advisability of improvement of any of the tributaries by means of slack water.

In view of the above facts it is my opinion that the Little Kanawha River is worthy of improvement by the General Government; that a survey of the same should be made; and that the questions relating to the limits of the improvement, the type or kind of improvement, and the depth of water to be provided by the improvement should await the results of the survey.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., June 21, 1909.

Respectfully returned to the Chief of Engineers, United States Army.

The Little Kanawha River has been improved for slack-water navigation by the construction of five locks and dams, covering a distance

Digitized by Google

of about 48 miles. The present investigation has in view the modification of the existing system and its extension presumably to reach the coal fields of West Virginia, which are some distance above the pool of the upper lock

Attention is invited to the board's report of February 10, 1908, on a survey for the location of one additional lock above the present system, published in House Document No. 917, Sixtieth Congress, first session, in which it stated—

In the opinion of the board no lock and dam should be built above No. 5, unless it is with a view to the complete slack-watering of the stream up to the coal fields. From present information, it would appear that this work would involve the construction of seven or eight locks and dams in addition to those now in existence, and, on the basis of the estimate contained within, would probably cost a minimum of $2,500,000 for concrete locks and dams of suitable dimensions for the economical transportation of coal, or about $1,500,000 for locks and dams of the smaller type to provide only for light-draft navigation. It is evident from these facts that the further prosecution of the slack-water system on this river should be undertaken only after a full and comprehensive study of the subject.

There seems to be serious doubt as to the sufficiency of the water supply to maintain a slack-water navigation in the upper river during low stages, and, so far as the board is informed, the ultimate object of the improvement, whether simply to carry a light draft navigation similar to that now in existence on the river, or to provide suitable navigation for handling coal by means of towboats and barges, has not been determined, nor has the advisability of extending navigation above Lock No. 5 by either plan been decided upon. These questions should all be definitely determined, having in mind the probable necessity for the reconstruction of the locks now in existence if a navigation suitable for the handling of coal boats is to be considered, before any further work with a view to extending navigation above Lock No. 5 is undertaken. If, with the approximate knowledge of the magnitude of this task laid before it in this report, Congress shall determine to initiate an investigation looking toward the improvement, it should include the whole of the river to the coal fields and not simply the portion to be affected by a single lock and dam above the existing Lock No. 5.

It appears from the language of the item calling for the present report that Congress had in view a comprehensive investigation on the lines suggested by the above quotation.

It is clear to the board that a complete survey with estimates of costs should be made in order to determine the advisability of any further improvement, and it therefore concurs in the recommendation of the district officer and the division engineer that such a survey be authorized, the scope of the proposed improvement to be determined after the survey has been made.

For the board:

JOHN G. D. KNIGHT,
Colonel, Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, June 26, 1909.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Little Kanawha River, W. Va., authorized by the river and harbor act of March 3, 1909.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. L. MARSHALL,
Chief of Engineers, U. S. Army.

Digitized by Google

[Fifth indorsement.]

WAR DEPARTMENT, *June 29, 1909.*

Approved.

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF LITTLE KANAWHA RIVER, W. VA.

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., January 31, 1910.

SIR: I have the honor to submit the following report on the survey of the Little Kanawha River, inclosing a plan of improvement, with estimate of cost of improvement and of maintenance.

The act of Congress approved March 3, 1909, required a preliminary examination of the "Little Kanawha River with a view to the modification of the existing system of locks and dams and its further improvement." This was assigned to me, accompanied by instructions in letters from office of the Chief of Engineers, dated March 8, 1909, and March 12, 1909.

The result of the preliminary examination was submitted to the Chief of Engineers in my report of June 8, 1909. In letter of July 6, 1909, from office of the Chief of Engineers, I was directed to make a survey, including preparation of plans and estimate of cost of improvement and maintenance.

The report submitted herewith is confined to investigation and information additional to that contained in my report of June 8, noted above.

THE SURVEY.

In view of the instructions from the Chief of Engineers of March 8, which indicated that economy was desired, only so much of the river was surveyed and only such work was done as seemed absolutely necessary.

Part of the river already improved by five locks and dams has not been resurveyed in its entirety, but survey was made of a short stretch of the river at the site of each of these locks. A continuous survey was made from Pool No. 5 to Burnsville, the extreme limit of possible improvement, and a profile of the river was made of the same stretch. Only a small drill party was employed, with small equipment. This party made comparatively few drill holes for the purpose of determining the elevation of the top of rock. These drill holes were generally made at points where at the time it was thought locks might be located. After the survey was plotted and studies made of a possible system of improvement, it was discovered that certain additional information was more or less desirable; for example, more topography beyond the top of the bank in certain localities. However, the season was too far advanced to obtain this additional information, and it is believed that the information which has been obtained is sufficient, as far as the survey is concerned, to allow a just conclusion as to whether this river should be improved or not, and for the preparation of an estimate as accurate as is possible without a detailed survey of each lock site and preparation of detailed plans.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

There is nothing unusual about the methods employed in the urvey which would make them worthy of special report. The sual level-and-transit methods were used and topography was aken with a stadia. The zero of the datum is the same as that used n the Ohio River, being the mean level of the sea at Sandy Hook.

Discharge observations made in connection with this survey will e referred to later.

Blue prints of the following maps of the survey are submitted erewith:

Profile of river, Pool No. 5 to Burnsville, 3 sheets.
Continuous map, Pool No. 5 to Burnsville, 37 sheets.[1]
Water and rail transfers at Parkersburg, 1 sheet.[1]
Maps of sites of Locks Nos. 1 to 5 (now built), 10 sheets.[1]

PHYSICAL CHARACTERISTICS, COMMERCE, ETC.

The geographical position, the general physical characteristics, ncluding discharge, the past improvements, the commerce past and rospective, with the resources of the Little Kanawha Valley, pari cularly the coal deposits, are described in my report of preliminary xamination referred to above. The additional information and omments on those various subjects follow.

PHYSICAL CHARACTERISTICS.

The five dams now built extend 4-foot navigation to Creston, 48 miles from the mouth of the river. The distance by river from Burnsville to Parkersburg is 122½ miles, while the air-line distance s about 60 miles. The unimproved section surveyed is therefore about 74½ miles.

The work on the survey confirmed previous report that there were few places where sand is found in large quantities on this river, and that shifting sand bars are unknown. On this account maintenance charges for dredging, etc., should not be high.

The survey shows that the river is quite narrow and crooked in its upper reaches. Moving downstream from Burnsville, in the first 7 miles 5 miles of river has a width between tops of banks of 130 feet or less, in the first 22 miles from Burnsville 7½ miles of river has a width between tops of banks of 150 feet or less, in the first 28 miles from Burnsville 22½ miles of river has a width between tops of banks of 200 feet or less, in the first 44 miles from Burnsville 28½ miles of river has a width between tops of banks of 220 feet or less, and 34½ miles of river has a width between tops of banks of 260 feet or less. In the first 5 miles from Burnsville there are several places where the width between tops of banks is not over 100 feet.

The total fall of the river from low water at Burnsville to low water at Parkersburg is 181 feet, which makes the average fall per mile 1.48 feet. From low water at Burnsville to surface of the present Pool No. 5 the average fall is 1.58 feet per mile, while the fall over the part of the river already improved is 1.315 feet per mile. The five locks in this part of the river have an average lift of 12.63 feet each.

[1] Not printed.

Digitized by Google

DISCHARGE.

As stated in my report on preliminary examination. Assistan Engineer Carpenter made some rough gaugings in 1874, from whic he derived a discharge of 12.58 cubic feet per second. This result considered unreliable. In 1908 Assistant Engineer Hall obtained discharge of 70.5 cubic feet per second at Lock No. 4 when the riv was lower than any previous recorded stage. This is consider reliable.

On the present survey discharge observations were taken at Glen ville, between which and the head of the survey there are no trib taries of importance. Glenville was selected because the Weath Bureau has for some years been keeping gauge observations at th point. However, the gauge observations during extreme low wate not having been considered important by the Weather Bureau observer, their records had to be omitted in considering the discharg observations. There is no other gauge on the upper river.

Discharge observations were made on September 1, November and November 22, last. They were made with a current met rated by the manufacturer, and readings were taken at horizont intervals of 10 feet, and at each of these points readings were tak at the surface and at every foot until the bottom of the river w reached. The cross section of the river was also very care measured. During both the summers of 1908 and of 1909 the L Kanawha River reached a very low stage, and the reading of Se tember 1 was taken at as low a stage as the river reached any ti during the past year. No exact records being available, the inha tants of the neighborhood were consulted, and as a result low wa was assumed at 0.18 of a foot below the stage of September 1, wh is 0.4 of a foot below the zero of the Weather Bureau gauge at Gl ville. This assumed low water, it is believed, may be taken w considerable assurance that low water never reaches below th stage, and it is doubtful if it ever reaches that stage. The thr observations referred to above give the following readings refer to the assumed low water:

Stage.	Discharge [illegible] per second.
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

From the above observations the low-water discharge was calc lated by several different methods, the result being about 54 cu feet per second for extreme low-water discharge.

With this discharge as a basis for the upper locks of the river was assumed that 25 per cent would be used in leakage and evapora tion and that the remainder would be used in lockages. This wo allow 25 lockages per day for each lock. For the lower part of th river with the upper locks a discharge of [illegible] cubic feet per secon was used, and after allowing 25 per cent loss there was sufficient wate for 21 lockages per day. This low discharge would demand a tig

Digitized by Google

ıcrete dam and valves so designed as to allow small leakage. With ks and dams so built, it seems that the water available will be ficient, especially in view of the fact that this low-water discharge uld be a very rare occurrence.

POPULATION.

The census of 1900 gives the total population of the five counties rough which this river flows as 85,668. The same census gives the pulation of the towns and villages on the Little Kanawha River, follows:

rnsville	318	Burning Springs	542
ıuts Mills	115	Palestine	190
ıd Fork	172	Davisville	109
enville	398	Nicolette	109
tonia	23	Parkersburg	11,703
antsville	225		
eston	154	Total	14,058

It is noted that there are no towns of any importance in this valley, cept Parkersburg, at its mouth.

RESOURCES.

The resources of the valley in timber, stone, oil, gas, and coal are ven in report of preliminary examination, and no additional informa- ɔn has been obtained.

PRESENT COMMERCE.

The existing commerce on this river is also given in my report on reliminary examination. However, attention is invited to the fact ıat an examination in detail of the satistics in this office shows that) per cent of the total tonnage for the past 10 years consists of saw ıgs, and 25 per cent consists of railroad ties. On this river railroad es and logs are floated downstream or towed in rafts. Some ties, owever, come down in flatboats, towed by gasoline craft.

PROSPECTIVE COMMERCE.

In treating of the prospective commerce of the Little Kanawha liver one is led to the conclusion that the movement of coal is the nly extensive commerce that is likely to be developed on this river ı the future. There is no reason for believing in an extensive devel- pment of commerce in any other line. Seventy-five per cent of the ommerce now consisting of logs and railroad ties, mostly floated or ransported in rafts, it is believed that further improvement of the iver by slack water would result in no benefit, and perhaps a detri- nent to this class of commerce. As for the development of any other ommerce, this valley will never be of importance from an agricul- ural standpoint, nor has it any cities or towns which might develop a ommerce. As noted above, the aggregate population of all the owns on the Little Kanawha River is about 14,000, and over 11,000

Digitized by Google

of this is the population of Parkersburg, at the mouth of the riv The total population of the counties bordering on this river is 86,0 With due allowance for the increase since the last census was take the valley must be considered as sparsely populated. The only po sible future commerce that would be of importance would be co mined in this vicinity, and the inquiry is at once raised as to wh development of this commerce might be reasonably expected. T only coal-carrying tributaries of the Ohio of importance are the M nongahela and (Great) Kanawha Rivers. With a view to throwin some light on the possible future for the Little Kanawha, the follo ing information is given as regards the other two tributaries:

MONONGAHELA RIVER.

The Monongahela River is improved by a system of fixed locks a dams, providing a depth of about 8 feet of water in the lower a more important part of this river, and 7 feet in the upper part. T following tables are self-explanatory:

TABLE I.—*Movement of coal to and through Pittsburgh, Pa., in tons.*

[From United States Geological Survey.]

Year.	To Pittsburgh district.	Through Pittsburgh to West.				Total shipments	
		By rail.	By water.	Total to west of Pittsburgh.	Per cent by water (Ohio River).	Total.	Per cent total west Ohio Riv
1900	.....	.....	2,557,470	.....	.....	20,718,537	
1901	.....	.....	3,283,353	.....	.....	24,711,890	
1902	11,071,039	14,568,750	3,619,905	18,188,655	20	29,259,694	
1903	11,463,640	15,965,442	3,069,299	19,034,741	16	30,498,381	
1904	9,257,527	16,017,327	2,811,584	18,828,911	15	28,086,438	
1905	11,021,553	18,370,368	3,926,319	22,296,687	18	33,318,240	
1906	11,948,229	22,419,496	2,883,965	25,303,461	11	37,251,690	

TABLE II.—*Movement of coal through Monongahela River locks and Davis Island Da 1890–1906.*

[From Geological Survey, Mineral Resources of the United States.]

Year.	Passed through locks on Monongahela River.	Passed Davis Island Dam, Ohio River near Pittsburgh.[1]	Differen approxima consumptio river con Pittsburg
	Tons.	*Tons.*	*Tons*
1890	4,652,104	3,420,357	1,2
1891	4,276,588	2,893,782	1,3
1892	3,872,340	2,290,294	1,5
1893	3,860,072	2,364,401	1,4
1894	4,649,612	2,453,787	2,1
1895	4,183,506	2,303,873	1,7
1896	5,709,252	4,102,190	1,6
1897	5,299,838	2,670,369	2,6
1898	6,120,800	2,979,494	3,1
1899	5,509,967	2,709,140	2,8
1900	5,817,863	2,557,470	3,2
1901	7,945,480	3,283,353	4,6
1902	[2] 9,305,927	3,619,905	5,6
1903	9,372,664	3,069,299	6,3
1904	6,985,576	2,811,584	4,1
1905	9,484,860	3,926,319	5,5
1906	9,724,781	2,883,965	6,8

[1] From annual reports Ohio River improvements.

[2] The coal traffic on the Monongahela is obtained by adding to that which passes Lock 3 the coal min and shipped in pools Nos. 1 and 2. In 1902 there were consumed in pools Nos. 1 and 2, 4,080,357 tons coal; in the harbor below No. 1, including the Allegheny River, 1,605,725 tons of Monongahela River co a total of 5,686,082 tons.

Digitized by Google

In considering Table I, showing coal shipments to and through ittsburgh, it is assumed that all of this coal comes from the Monon-hela Valley, which is believed to be true. After making due allow-ice for yearly fluctuations this table seems to indicate that while e total shipments of coal from the Monongahela Valley to and rough Pittsburgh are increasing, the amount of coal sent from ittsburgh down the Ohio is not materially changing, which is also nfirmed by Table II, covering a larger number of years. It is also oted that an average of only 7 to 13 per cent of the total coal traffic rough Pennsylvania goes down the river. Table II also indicates at while the coal sent to Pittsburgh on the Monongahela is rapidly creasing, the increase is consumed at that point. The rail shipments the west of Pittsburgh have also very largely increased during the eriods noted in Tables I and II, amounting in 1906 to over 22,000,000 ons. This coal goes in a general northwesterly direction from ittsburgh, a considerable portion finding its way to the nearest ake ports.

There has been much speculation recently as to whether the Ohio iver coal shipments from Pittsburgh would not decrease in the ear future, due to the great demand for coal in Pittsburgh and the ail territory tributary to it, while the Ohio River can obtain coal rom the Kanawha River, if it so desires. There has been a per-istent rumor that the United States Steel Corporation was buying oal properties, which would very largely decrease the coal shipments t once, as they wished to conserve the coal for their own use in the icinity of Pittsburgh, Pa.; Youngstown, Ohio; Cleveland, Ohio, etc.; nd I have been assured by reliable people that such is the case. A onsideration of the low cost of coal in Pittsburgh at this time and he rise in price which is bound to come with its present profligate use loes not make this seem improbable. However, it is only desired o call attention in the case of the Monongahela River to the fact hat coal shipments from there down the Ohio River have not naterially increased for a considerable range of years, and now are nly a small percentage of the total coal traffic, which traffic is rapidly ncreasing. Should the other shipments be increased only a small percentage at the expense of the Ohio River shipments, it would make a great proportional inroad on them. Also as Monongahela coal is about three times the amount of (Great) Kanawha coal shipped over the Ohio River, a change in the former would mean a proportionally large change in the percentage of the coal shipped by river. Should the Monongahela shipments to the Ohio River decrease, it would probably be overcome by increased shipments from the (Great) Kanawha, or, if the Little Kanawha were improved, by shipments from that field.

KANAWHA RIVER.

The (Great) Kanawha River is improved by a system of 10 locks and dams, 2 of which are fixed and 8 movable, and provide a 6-foot navigation. On open river with dams down greater depths may be obtained. This improvement was completed in 1898.

Considering the (Great) Kanawha and Monongahela Rivers with respect to location, depth of slack-water navigation, capacity of locks, and situation in the coal fields, the actual conditions of exist-

Digitized by Google

ing coal traffic on the (Great) Kanawha are better suited than tho on the Monongahela for comparison with an improved Little Kanawi River.

There are several coal companies engaged in mining and tra porting coal by this river to Cincinnati and intermediate points the Ohio. Little, if any, of the (Great) Kanawha River coal g to points below Cincinnati, due probably to the fact that the ton barges drawing but 6 feet can not compete with the 1,000-t barges and larger towboats sent from the Monongahela field. T following table gives a statement of the (Great) Kanawha co traffic in recent years:

TABLE III.—*Kanawha River coal traffic.*

Year.	Total coal shipment.	Total passing into Ohio River (passing Lock No. 11).	Amount summed o
	Tons.	*Tons.*	*Tons*
1890	966,462	.....	.....
1891	1,080,454	.....	.....
1892	1,071,511	.....	.....
1893	919,230	.....	.....
1894	1,032,840	.....	.....
1895	879,204	.....	.....
1896	922,000	.....	.....
1897	650,680	.....	.....
1898	1,089,160	.....	.....
1899	942,800	.....	.....
1900	1,240,680	.....	.....
1901	1,370,180	1,228,251	[illegible]
1902	937,880	841,300	[illegible]
1903	1,333,920	1,200,259	[illegible]
1904	1,094,700	990,777	[illegible]
1905	1,460,680	1,322,111	[illegible]
1906	1,176,300	1,072,807	[illegible]
1907	1,667,000	1,526,507	[illegible]
1908	965,000	881,837	[illegible]

It is noted that there is a slight increase in the coal commerc this river during the last 19 years, and during the years of w there is record the consumption on the river has not mater changed. During this period the Kanawha Valley as a whole wonderfully improved; Kanawha River rail shipments have gre increased; the country generally has had an area of prosperity all of proportion to this increase. It appears that the principal rea this coal traffic has not been extended is because of the lack of ma kets. The Campbells Creek Coal Co. says in this connection un date of August 17, 1909:

We have in former years produced and shipped by water as much or more co we now ship by both rail and water. We have the barges, towboats, harbors, elev tipples, and all equipment for river shipments and prefer to ship that way if we c reach the markets, but of late years we have been shipping some coal all rail fro mines for the reason that we have to ship all rail in order to get rates to reach i markets. * * *

Coal transported by water can only be gotten back into the country a short dist and this distance has been gradually reduced to its present smallness because railroads will not make rates from river points that will enable river coal to com with coal that comes all rail from the mines.

* * * * * * *

The Chesapeake & Ohio and Norfolk & Western Railroads will deliver coal any within the switching limits of Cincinnati at the $1 rate from West Virginia. It c us, in freight, to ship coal from our elevators on the river at Cincinnati to the differ

Digitized by Google

ctions within the city limits as much as from 20 to 25 cents per ton on some of the ads. These conditions prevent us from reaching this trade as we formerly did and ves this business to the all-rail coal. In consequence, while there have been a eat many manufactories built up about Cincinnati the last 10 years, these manuctories have none of them, we might say, found it to their interest to buy river coal ving to the rates by the railroads, so that the river coal has not been able to secure ay increased business that has come to Cincinnati by its increased manufacturing lants. This same applies to about all sections of the country that were formerly eached by river coal.

These conditions were brought about by the connection between the railroads and he coal-mining interest of several sections of the country, through ownership in both ailroads and coal mines, on the part of some individuals or syndicates, and largely or nally, because of the large coal-carrying roads in compelling, through their traffic onnections, the local roads, for example, that run out of Cincinnati to the North and Vest, to make such prorates as will enable the all-rail coal to go into the more distant as vell as immediate coal markets and to hold up local rates so high out of Cincinnati as to eep the river coal from getting into these markets, at least with any force or effect.

The report of the Internal Waterways Commission, 1908, says p. 114):

River coal forms a considerable factor in the local trade at Cincinnati, and there are 4 coal elevators on the river at Cincinnati and 8 more on the Kentucky side. Formerly Cincinnati was also an important distributing point for river coal; but this trade has argely disappeared. No coal is now shipped by river from Cincinnati except such as nay be held there for a time on its way down the river, and such cargoes are not vhandled at Cincinnati. Rail shipments of river coal from Cincinnati are made principally to southeastern Indiana, to the district outlined by the cities of Jeffersonville, Indianapolis, and Richmond. Some shipments are made to points in Indiana outside of this territory. Some of these points are reached only at a premium over all-rail shipments, as the river coal is said to be more desirable for domestic purposes on account of the rescreening at Cincinnati.

Much the greatest share of the coal distributed by rail from Cincinnati is of coal received at Cincinnati by rail. This coal is brought to Cincinnati by the following railroads: Chesapeake & Ohio, Norfolk & Western, Baltimore & Ohio Southwestern, Louisville & Nashville, and Queen & Crescent.

Much of this rail coal is consumed at Cincinnati and vicinity, but the greater part of it is turned over to other railroads at Cincinnati—such as the Big Four; Cincinnati, Hamilton & Dayton, and the Pennsylvania Lines, and consigned to points in the Northwest and Canada. This all-rail trade to the Northwest includes Chicago and points in Wisconsin, Minnesota, North and South Dakota, and Iowa.

Annual receipts and shipments of coal, in bushels, Cincinnati, Ohio.

[From report of Cincinnati Chamber of Commerce, 1908.]

RECEIPTS.

Year.	By river.	By rail.	Aggregate.
1897	53,042,776	25,719,250	78,762,026
1898	61,315,830	26,962,925	88,278,755
1899	52,356,278	31,464,050	83,820,328
1900	44,570,535	28,778,500	73,349,035
1901	51,115,381	40,275,600	91,390,981
1902	60,030,043	44,570,550	104,600,593
1903	55,431,966	56,919,925	112,351,891
1904	43,817,783	74,366,000	118,183,783
1905	72,935,000	87,885,000	160,820,000
1906	56,739,000	117,218,000	173,957,000
1907	64,647,000	85,333,000	149,980,000
1908	35,765,000	84,872,000	120,637,000

SHIPMENTS.

1897	3,509,056	15,664,000	19,173,056
1898	1,786,379	14,921,400	16,707,779
1899	1,195,436	14,043,600	15,239,036
1900	2,811,771	11,780,850	14,592,621
1901	5,207,771	22,047,025	27,254,796
1902	6,113,597	30,524,150	36,637,747
1903	2,787,000	36,635,750	39,422,750
1904	3,448,000	41,228,000	44,676,000
1905	6,433,000	57,541,000	63,974,000
1906	5,833,000	93,212,000	99,045,000
1907	5,006,000	66,408,000	71,414,000
1908	3,380,000	60,854,000	64,234,000

Digitized by Google

Under present conditions, then, it would seem that (Great) Kanawha River coal had reached its limit of development, but there are many indications that conditions will be changed in the future. The project for the improvement of the Ohio River by locks and dams seems about to be undertaken by Congress, which improvement would be of greatest value to the Kanawha coal in allowing it to compete with rail-shipped coal. Also, it seems not improbable that Congress will in the near future so regulate affairs that the railroads will be compelled to discriminate less against river traffic. A change in these two particulars would, I believe, mean a remarkable increase in Kanawha River coal shipments.

Comparing the (Great) Kanawha and Little Kanawha Rivers as to their relative availability for sending coal down the Ohio River the following differences are noted:

The Little Kanawha River, with its low-water discharge of 70 feet per second, has a minimum width of less than 100 feet with a great many very sharp bends. The (Great) Kanawha River, with its minimum discharge of 1,000 cubic feet per second, has a minimum width of 300 feet and no very sharp bends. This means that the Little Kanawha River locks must be smaller than those on the Kanawha, that the tows on the Little Kanawha must be much smaller than those on the Kanawha; while the discharge means that the Little Kanawha River must have fixed locks and dams, while on the Kanawha River, with its movable dams, unusually large tows are sent out in time of freshets, without the cost of the delays caused by passing through locks. In addition to the above, the coal fields on the Little Kanawha are about 110 miles from its mouth and 393 miles from Cincinnati, while on the (Great) Kanawha they are [illegible] miles from its mouth and 293 miles from Cincinnati. It seems, then, that the cost of transporting coal from the Little Kanawha River field to Cincinnati would exceed the cost of transporting coal from the Kanawha field to the same market.

PROJECT.

This project is based on the assumption that improvement and further extension of the slack-water system on the Little Kanawha River will not be undertaken except for the purpose of providing facilities for the transportation of coal. Locks are therefore assumed of such size as to accommodate the standard Ohio River coal barge, which is 26 feet wide and not over 135 feet long. The navigable depth is taken as 6 feet. Less than 6 feet depth is considered uneconomical and not fitted to the coal barge. The river is not considered adapted to a greater depth. The existing locks, Nos. 1 to 4, inclusive, have dimensions of available chambers 125 feet long by 23 feet wide; while Lock No. 5 is 125 feet by 26 feet, and provide a navigable depth of 4 feet. These existing locks are not suitable for coal traffic; this project provides for their removal and for the construction of dams and larger locks below those removed, with pools in each case just 2 feet higher than at present. A study of the profile of this river shows that the fall from Buffalo Shoal, just below Burnsville, to Pool No. 19, Ohio River, at Parkersburg, W. Va., can be overcome by 15 locks and dams with a lift of 12.5 feet or less, and this project therefore provides for the construction of 15 concrete

Digitized by Google

locks and fixed concrete dams. Eleven of these are shown on the profile of the river from Pool No. 5 to Burnsville. The location of each dam is also indicated in red on the map[1] of the survey of the river in general and of the maps[1] of sites of present Locks Nos. 1 to 5, inclusive.

Locks.—The river from Parkersburg to Creston is of sufficient width to allow the construction of locks having chambers with available length of 280 feet and width of 54 feet. Above Creston, on account of the small distance between river banks, locks having a width of 54 feet are impracticable, unless set far into the banks at an excessive cost. The width of chamber for locks above Creston is therefore assumed at 28 feet. All locks are given upper and lower concrete guide walls 300 feet in length. An intermediate set of gates is also provided in each lock chamber to save water.

Dams.—As the low-water discharge of this river is very small, tightness of dams is a necessity. Fixed concrete dams are therefore assumed and are designed with ogee section.

Locations.—In making tentative locations of locks and dams and assumption of lifts, the height of river banks, width of river, position of tributaries, foundations, and other local conditions were considered. The following table gives the tentative locations, lift of dams, and principal dimensions of locks:

No. of lock and dam.	Miles from Parkersburg, W. Va.	Lift.	Lock chamber.	
			Length available	Width.
1	3.5	8.1	280	54
2	14.5	10.7	280	54
3	25.5	11.3	280	54
4	31.0	12.2	280	54
5	41.0	12.4	280	54
6	46.5	12.5	280	54
7	56.4	12.5	280	28
8	64.9	12.5	280	28
9	74.5	12.5	280	28
10	83.0	12.5	280	28
11	92.6	7.3	280	28
12	101.0	11.0	280	28
13	105.8	10.0	280	28
14	110.9	12.0	280	28
15	115.2	10.0	280	28

Estimate.—The detailed estimate for each lock and dam is as follows:

Nos. 1 to 6, inclusive. (*Lock chambers, 54 feet by 280 feet; 300-foot upper and lower concrete guide walls; and concrete dam.*)

Number 1:

Excavation, 69,720 cubic yards, at $1	$69,720
Concrete, 38,439 cubic yards, at $8	307,512
Back fill, 23,400 cubic yards, at $0.50	11,700
3 pairs steel gates, at $10,000	30,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	433,432

[1] Not printed.

Digitized by Google

Number 2:

Excavation, 58,860 cubic yards, at $1	$58,86[illegible]
Concrete, 27,486 cubic yards, at $8	219,88[illegible]
Back fill, 15,548 cubic yards, at $0.50	7,77[illegible]
3 pairs steel gates, at $10,000	30,00[illegible]
Buildings	12,00[illegible]
5 acres land, at $300	1,50[illegible]
Paving, etc	1,00[illegible]
Total	$31,02[illegible]

Number 3:

Excavation, 72,440 cubic yards, at $1	72,44[illegible]
Concrete, 26,086 cubic yards, at $8	208,6[illegible]
Back fill, 14,620 cubic yards, at $0.50	7,3[illegible]
3 pairs gates (steel), at $10,000	30,00[illegible]
5 acres land, at $300	1,5[illegible]
Buildings	12,00[illegible]
Paving, etc	1,00[illegible]
Total	332,9[illegible]

Number 4:

Excavation, 33,900 cubic yards, at $1	33,9[illegible]
Concrete, 27,517 cubic yards, at $8	220,1[illegible]
Back fill, 15,860 cubic yards, at $0.50	7,[illegible]
3 pairs gates (steel), at $10,000	30,00[illegible]
Buildings	12,00[illegible]
5 acres land, at $300	1,5[illegible]
Paving	1,00[illegible]
Total	306,4[illegible]

Number 5:

Excavation, 87,840 cubic yards, at $1	87,[illegible]
Concrete, 39,104 cubic yards, at $8	312,[illegible]
Back fill, 23,400 cubic yards, at $0.50	11,[illegible]
3 pairs gates (steel), at $10,000	30,00[illegible]
Buildings	12,00[illegible]
5 acres land, at $300	1,5[illegible]
Paving, etc	1,00[illegible]
Total	456,[illegible]

Number 6:

Excavation, 37,633 cubic yards, at $1	37,6[illegible]
Concrete, 29,169 cubic yards, at $8	233,[illegible]
Back fill, 13,000 cubic yards, at $0.50	6,5[illegible]
3 pairs gates (steel), at $10,000	30,00[illegible]
Buildings	12,00[illegible]
5 acres land, at $300	1,5[illegible]
Paving, etc	1,00[illegible]
Total	321,5[illegible]

Nos. 7 to 15, inclusive. (*Lock chambers, 28 feet by 280 feet; 300-foot upper and lower concrete guide walls and concrete dam.*)

Number 7:

Excavation, 50,780 cubic yards, at $1	$50,[illegible]
Concrete, 22,110 cubic yards, at $8	176,[illegible]
Back fill, 30,000 cubic yards, at $0.50	15,00[illegible]
3 pairs gates (steel), at $5,000	15,00[illegible]
Buildings	12,00[illegible]
5 acres land, at $300	1,5[illegible]
Paving, etc	1,00[illegible]
Total	272,[illegible]

Digitized by Google

Number 8:

Excavation, 32,680 cubic yards, at $1	$32,680
Concrete, 22,080 cubic yards, at $8	176,640
Back fill, 17,810 cubic yards, at $0.50	8,905
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	247,725

Number 9:

Excavation, 48,417 cubic yards, at $1	48,417
Concrete, 21,952 cubic yards, at $8	175,616
Back fill, 15,310 cubic yards, at $0.50	7,655
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	261,188

Number 10:

Excavation, 78,550 cubic yards, at $1	78,550
Concrete, 26,482 cubic yards, at $8	211,856
Back fill, 20,600 cubic yards, at $0.50	10,300
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	330,206

Number 11:

Excavation, 44,095 cubic yards, at $1	44,095
Concrete, 21,593 cubic yards, at $8	172,744
Back fill, 16,737 cubic yards, at $0.50	8,368
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	254,707

Number 12:

Excavation, 51,269 cubic yards, at $1	51,269
Concrete, 24,434 cubic yards, at $8	195,472
Back fill, 17,330 cubic yards, at $0.50	8,665
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	284,906

Number 13:

Excavation, 57,030 cubic yards, at $1	57,030
Concrete, 27,082 cubic yards, at $8	216,656
Back fill, 17,110 cubic yards, at $0.50	8,555
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	311,741

Digitized by Google

Number 14:

Excavation, 57,135 cubic yards, at $1	$57,135
Concrete, 21,618 cubic yards, at $8	172,944
Back fill, 17,900 cubic yards, at $0.50	8,950
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	268,529

Number 15:

Excavation, 60,750 cubic yards, at $1	60,750
Concrete, 26,515 cubic yards, at $8	212,120
Back fill, 18,000 cubic yards, at $0.50	9,000
3 pairs gates (steel), at $5,000	15,000
Buildings	12,000
5 acres land, at $300	1,500
Paving, etc	1,000
Total	311,370

In making this estimate unit prices have been assumed which are believed to be ample for doing the work. In all cases of doubt the most unfavorable conditions have been assumed. It is probable that detailed studies will enable these figures to be reduced, but it was attempted in these estimates to obtain figures for which the river could surely be slack-watered. The high estimates made for the individual locks directly has led to small figures in the items contingencies, supervision, etc., in the total estimate given below

Estimate of total cost.

15 locks and dams (as above)	$4,725,247
Dredging, 20,000 cubic yards at $0.25	5,000
Removing existing locks and dams	40,000
Contingencies, supervision, etc	229,753
Total	5,000,000

Should this project be adopted, the first step should be an appropriation for making detailed surveys, purchase of sites, and the preparation of detailed plans and estimates. This can be done for $60,000.

Maintenance.—The annual cost of maintenance of the proposed improvement is as follows:

Office expenses and superintendence	$5,000
Labor	39,000
Fuel	1,000
Repairs and miscellaneous	6,000
Removing obstructions, dredging, etc	3,000
	54,000

CONCLUSION.

It is believed that, from an engineering standpoint, the improvement of the Little Kanawha River by a system of fixed locks and dams is entirely feasible, and that such a system would obtain a navigable depth of 6 feet from the mouth to Burnsville, and that that depth could be maintained thereby; and it seems under present conditions all the coal that can be shipped to markets over the Ohio River can be delivered to it by the Monongahela and Great Kanawha

Digitized by Google

Rivers. However, with the Ohio improved and with the railroads compelled to receive coal on a more favorable basis, there would be an enormously increased demand for Ohio River coal, or should the Monongahela River shipments be decreased, a demand would be created for coal supplied from some other point on the Ohio. In either of these cases there is much reason to believe that the Little Kanawha River fields could enter into the competition even though they be somewhat handicapped.

In conclusion I would recommend, first, that no improvement of the Little Kanawha River be undertaken until it has been definitely decided to slack-water the Ohio River, at least as far downstream as Cincinnati;[1] and, second, that if such improvement be decided on and if the railroads be compelled to discontinue discriminations against river traffic, that detailed surveys, purchase of sites, and preparation of plans and estimates be authorized with a view to improving the Little Kanawha River by a system of locks and dams as outlined in the project given above at an estimated cost of $5,000,000. Whether the Ohio River is to be improved and how railroads are to be regulated are matters on which Congress itself would be best informed.

ADDITIONAL SUBJECTS.

The additional subjects on which Congress desired information are given below.

TRANSFER AND TERMINAL FACILITIES.

The terminal transfer facilities divide themselves, naturally, into those at Parkersburg and those up the river.

In speaking of these facilities, a steam log lift is referred to. This consists in all cases of an incline timber runway or platform over which the logs are dragged, either by fastening a rope to them individually and snaking them up the incline, or by having an endless chain running on rollers, which chain is provided with prongs or teeth, which catch in the logs and carry them up the incline. The object of the platform or runway seems to be to keep the logs out of the mud and reduce the friction.

Above Parkersburg.—At Elizabeth, about 25 miles above the mouth of the river, is a public wharf built and maintained at the town's expense, which consists essentially of a paved section of the bank. At Palestine Transfer, 32 miles above the mouth, the present easterly terminus of the Little Kanawha Railway, there is a lift similar to the steam log lifts, but intended for taking ties from the water and transferring them into cars. There is also an inclined track from the railroad to the water, which belongs to the railway company, and is used for transferring all classes of commerce from the railroad to and from the river. Burning Springs and Creston each have a small privately owned wharf boat, which extends shipping facilities to all on equal terms. At many other places along the Little Kanawha River there are public highways to the river where freight is received and discharged without any other facilities.

[1] Since the date of this report a project for the Ohio River improvement from Pittsburgh to the mouth of the river has been adopted by Congress.

Digitized by Google

At Parkersburg (attention is invited to sheet [1] L. K. 11/26, showing the water and rail transfers at Parkersburg).—At this point are the Baltimore & Ohio and the Little Kanawha Railways, and the Parkersburg & Marietta Inter-Urban Railway Co., the latter an electric line which handles freight, but has no terminal facilities. There is a public wharf at Parkersburg at the junction of the Ohio and Little Kanawha Rivers, extending a short distance along the Ohio and extending up the Little Kanawha about 800 feet. This consists of nothing more than a paved slope of the river bank. There is also a wharf boat at this wharf which is private property licensed by the city. There is an incline track from the Baltimore & Ohio to two points on the Little Kanawha River, one for receiving and discharging freight to and from the river, and the other for receiving and discharging cars to a ferry which transfers them across the Little Kanawha River to the Little Kanawha Railway on the opposite side, which latter also has an incline track to the water's edge. These incline tracks are built almost parallel to the river, and have comparatively low grade so that a locomotive can pull a car up them when necessary. There are also three steam log lifts, used by private concerns, in the Little Kanawha River.

Ownership of water front.—The following is the ownership of the Ohio and Little Kanawha river water fronts in the city of Parkersburg:

From the upper intersection of the northerly city line with the Ohio River to the Baltimore & Ohio Railroad bridge over the Ohio River the property is owned by individuals and small industrial companies, except about 250 feet of river front a short distance above the mouth of Pond Run, which is owned by the city of Parkersburg and used for its pumping station. From the Baltimore & Ohio Railroad bridge (foot of Sixth Street) to the foot of Second Street on the Ohio River the river front is owned by the Baltimore & Ohio Railroad Co. From the foot of Second Street about 500 feet along the Ohio to the mouth of the Little Kanawha River and up the Little Kanawha River above 300 feet to the Baltimore & Ohio Railroad bridge across the Little Kanawha River at the foot of Ann Street the river front is owned by the city of Parkersburg, which has given the Ohio River Railroad Co. (now owned by the Baltimore & Ohio Railroad Co.) the right to use this frontage and lay tracks upon it for transportation purposes so long as this is done in a manner not to interfere with the public usage of the wharf, etc. From the Baltimore & Ohio Railroad bridge at the foot of Ann Street to the foot of Green Street (about 1,600 feet along the Little Kanawha River), the river front is owned and controlled by the Baltimore & Ohio Railroad Co., and is now used for its freight station and its incline track for transferring between water and rail. From the foot of Green Street to the easterly city line at the mouth of Worthington Creek the river front is owned by individuals and small industrial companies, except at the Little Kanawha Railroad ferry which is owned by the Little Kanawha Railroad Co., and at the crossing of the Parkersburg & Marietta Inter-Urban Railway Co. which is owned by the Parkersburg & Southside Industrial Co., and several thousand feet of river front a short distance below the mouth of Worthington Creek, which is owned by the Standard Oil Co. and is now occupied by its Parkersburg refinery.

[1] Not printed.

Digitized by Google

It is noted that a large proportion of the best water front is owned by the Baltimore & Ohio Railroad Co. The ownership on the south bank of the Little Kanawha is of lesser importance and is not known.

Future improvements.—The mouth of the Little Kanawha River for 4 or 5 miles is the best harbor which can be found for many miles up or down the Ohio, although at times it is subjected to an ice flow. In addition to the facilities mentioned, this section of the river has a floating dry dock, and has generally a large number of log rafts along its banks, so that ordinarily it is congested for a considerable distance upstream and at times during the winter when many crafts are harbored there it is very badly congested. On this account and because of the occasional ice flows it is more or less desirable even at present to improve the storage facilities of the mouth of this river, but in case of an increase of commerce it will be particularly desirable. With this in view, Worthington Creek, which empties into the Little Kanawha River about 2 miles above its mouth, has been examined. It flows through very low country, and for some distance has almost no fall. The land along its banks at present is of little value, and it is believed the most natural way to increase the harbor area would be to dredge a sufficient basin at the mouth of this creek.

As for the loading and unloading of merchandise in general the arrangements at the wharfboat are uneconomical, as teams can haul very little up the steep bank, and no power is employed for any part of the process. Some method of raising the material with power should be used. A wall along the Ohio River front is suggested, with its top a considerable distance above low water, extending some hundreds of feet along the river and with proper protection for boats from passing drifts, ice, etc. This should be equipped with an electric hoist on top of wall and properly connected to the land behind it. Such an arrangement may not be the most economical to build (detailed study not having been made), but it would serve the purpose very well. The Ohio River is suggested instead of the Little Kanawha River because the banks of the latter are largely used at present and because on the Ohio River it can be used by both Ohio River and Little Kanawha River boats.

WATER POWER.

At each of the locks on an improved Little Kanawha River there will be times when no water power is available. If we consider only the eight most favorable months in the year, at Dam No. 1 there will still be periods when no water power is available, due to a rise in the Ohio River, which has a very large oscillation as compared to the Little Kanawha River. At Dams Nos. 2, 3, 4, and 5 the minimum theoretical horsepower available for eight months is about 175. As we proceed up the river this figure will decrease. While the total water power available at times would be large, it would have little or no value, because of its short duration and unreliability.

The only company generating power for electric purposes in the Little Kanawha Valley is in Parkersburg, being the Parkersburg & Marietta Inter-Urban Railway Co., which company, after making some investigations, in conjunction with this office, wrote as follows:

I wish to state that after a careful study of the question I can not see how the power available would be of particular service to our company by virtue of any saving that might be effected by its use. From the data at hand I feel reasonably certain that

Digitized by Google

there would not be available an average of more than 200 kilowatts during nine months in the year. Approximately, the cost of building forebay, penstocks, turbines, transformers, etc., and a transmission line (to say nothing of auxiliary power) would be about $50,000. Therefore, when the fixed charges on this capital, the cost of the water and extra attendants, engines, taxes, maintenance, etc., are taken into careful consideration the utilization of this power at Parkersburg does not prove attractive

Referring to the use of this power farther up the valley, there are no towns which could utilize this power in their present condition and if manufactories were built, it would probably necessitate shipping most of their products out of the valley for consumption, and perhaps obtaining their raw material from elsewhere also. But the greatest objection to the use of this water power in the valley is the extremely low price of natural gas. A great deal of gas goes to waste in that vicinity, and it seems that it can be obtained for manufacturing purposes as low as 6 or 8 cents per 1,000 feet. Moreover, should this gas supply be exhausted, this would be a region of cheap coal with a slack-water river.

Under the circumstances, I do not believe it would be advantageous at the present time or in the near future to provide for furnishing water for water-power purposes at any new dams on the Little Kanawha River. The use of this water for power purposes seems a remote contingency.

SPECIAL INVESTIGATIONS.

I do not believe there are any other subjects connected with the Little Kanawha River which would require special investigation in this connection.

Respectfully submitted.

F. W. ALTSTAETTER,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer).

ENGINEER OFFICE, UNITED STATES ARMY,
CENTRAL DIVISION,
Cincinnati, Ohio, February 8, 1910.

SIR: I have the honor to submit herewith my comments upon the report of Capt. F. W. Altstaetter, Corps of Engineers, upon the survey of the Little Kanawha River, forwarded this date to the Chief of Engineers.

In the report of Capt. Altstaetter a project is submitted for the improvement of the Little Kanawha River by the construction of a series of 15 fixed dams and locks, at an estimated cost of $5,000,000, with an annual cost of maintenance of $54,000.

Capt. Altstaetter recommends the adoption of this plan of improvement upon certain conditions—that the improvement of the Little Kanawha be not undertaken until it has been definitely decided to slack-water the Ohio River, that the railroads be compelled to discontinue discriminations against river traffic, and that there will be a demand for Little Kanawha River coal (mainly based upon the assumption that a decrease in the coal tonnage out of the Monongahela River down the Ohio is at hand or to be expected on account of

Digitized by Google

ncreased use of coal in the vicinity of Pittsburgh). These conclusions re negative.

It is assumed that the coal shipments from the Monongahela River re decreasing, or have reached the maximum and are about to lecrease. The improvement of the Ohio River, as yet, has been of ittle benefit to coal-fleet navigation, except that Dams 1–6 have exended the pool facilities of Pittsburgh Harbor. Fleet navigation nust still await higher stages of water, in other words, is still dependnt upon the natural conditions of the river. If it should develop hat the maximum coal shipments from the Monongahela have been eached, it may be due entirely to the fact that such shipments epresent the maximum upon the still unimproved Ohio River. It s to be noted, also, that other States have steadily increased their oal output. For the years 1906 and 1907 the increase in percentage nd short tonnage is as follows:

	Per cent.
Vest Virginia	11
)hio	16
Kentucky	11
ndiana	16
llinois	24
'ennsylvania	16

	Short tons.
Vest Virginia	4,801,233
)hio	4,410,779
Kentucky	1,099,477
ndiana	1,893,153
llinois	9,837,042
'ennsylvania	20,849,971

This increase in the coal output of the neighboring States means readjustment of local markets and modification of coal shipments. Therefore, the assumption that the coal shipments from the Monongahela down the Ohio River have decreased is not warranted by the acts and is merely conjectural.

The refusal of railroads to prorate on river and rail shipments loes hamper river commerce. The use of the river for transportation s more and more restrained by the power of the railroads to raise ocal rates from river points, thus making the combined river and ail rates higher than the through rail rate.

The discharge of the Little Kanawha River, as estimated in the eport of Capt. Altstaetter, is low; and it seems possible, from expeience on other similar streams, that it may even be lower. In addiion the river is narrow and crooked, at several places in the upper eaches of the river the width between the tops of banks being not ver 100 feet. The coal deposits are in the upper portion of the iver, the Pittsburg vein of coal outcrops generally from Glenville to Burnsville and the Freeport vein above Burnsville. The improvenent of the river could not be utilized without the construction, utside its banks, of extensive basins; the cost of these and of the ther needed terminal facilities would necessarily be high and not hargeable to the United States. It should be definitely known that hese will be provided before any improvement is undertaken.

The size of the locks as within provided for is, from Nos. 1 to 6, 54 feet by 280 feet, and from Nos. 7 to 15, 28 feet by 280 feet. The necessity for these large locks is not apparent. The old Muskingum

Digitized by Google

locks are 36 feet by 160 feet. The cost of improvement by larger locks is much more than by smaller locks.

The full use of the Little Kanawha River, if improved, must await the improvement of the Ohio River, the main trunk stream, and this has only commenced.

It is my opinion, therefore, that the Little Kanawha River is not worthy of improvement by the General Government at the present time.

Very respectfully, your obedient servant.

J. G. WARREN,
Lieut. Col., Corps of Engineers,
Division Engineer.

The CHIEF OF ENGINEERS, U. S. ARMY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 12, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The existing five locks and dams on the Little Kanawha River extend 4-foot navigation to Creston, 48 miles above the mouth. The distance from the mouth to Burnsville, the head of the proposed improvement, is 122.5 miles. The unimproved section between Dam 5 and Burnsville, is 74.5 miles. In its upper portion the river is crooked and very narrow. The fall from Burnsville to the mouth is 181 feet, or 1.48 feet per mile. Discharge observations taken in 1874 indicated a low-water discharge of about 12.5 cubic feet per second. This result has been regarded as unreliable. In 1908 a low-water discharge at Lock No. 4 gave 70.5 cubic feet per second. During the survey the river was gauged at Glenville, about 16 miles below Burnsville; the stage of water ranged from +0.18 to +0.6, the discharge being 71.87 to 123.86 cubic feet per second. From these data the low-water flow was calculated to be about 54 cubic feet per second.

The commerce of this river for a number of years has averaged about 100,000 tons, about three-fourths of which consisted of timber or its products floated in rafts. On the reach above Creston the tonnage is small, probably 10,000 annually. The natural resources of the country are sandstone, limestone, brick clays, timber, gas, and, most important, the Freeport and Pittsburgh coal veins, varying in thickness from 5 to 8 feet. While all these commodities exist to a greater or less extent, the only source of prospective commerce to be considered looking for justification of any extensive improvement is the coal fields centered about Burnsville.

The section of country traversed by this river is at present sparsely settled, as indicated by the list of towns and their population, as given within, which shows a total population of 14,058, of which 11,703 is credited to Parkersburg, situated at the mouth of the river. It will be seen, therefore, that the total village population of the Little Kanawha above its mouth is 2,355. The project presented is stated to be based on the assumption that no further slack water improvement on the Little Kanawha would be undertaken, except for the purpose of providing facilities for the transportation of coal. The locks pro-

Digitized by Google

osed, therefore, are of suitable size to accommodate the standard Ohio River coal barge, which is 26 feet wide and about 135 feet long. The navigable depth proposed is 6 feet. A less depth than 6 feet would not provide facilities suitable for the economical transportation of coal, and the river is not considered adapted for improvement to a greater depth.

The existing locks, 1 to 4 inclusive, are 23 feet wide, with an available length of 125 feet. Lock No. 5 is 26 feet wide and 125 feet in length. The navigable depth over this improved reach is 4 feet. As these locks are not suitable for coal traffic, the project presented provides for their removal and for the construction of 15 new locks and dams, with a lift of 12.5 feet or less. Eleven of these are between the present pool No. 5 and Burnsville. Burnsville is taken as the head of the proposed improvement, as it is situated in the vicinity of the important Pittsburgh and Freeport coal veins.

The dimensions of the locks proposed from the mouth of the river up to Creston are 54 feet by 280 feet. Above Creston, on account of the narrow river, a width of 28 feet is proposed. On account of the small low-water discharge, tight dams are essential for a successful improvement, and therefore it is proposed to build them of concrete. The estimated cost of the improvement is $5,000,000, and $54,000 per year for maintenance.

The conclusion is reached by the district officer that if the railroads be compelled to discontinue discriminations against river traffic that detailed surveys, purchase of sites, and preparation of plans and estimates be authorized, with a view to improving the Little Kanawha River in accordance with the plan outlined above, at an estimated cost of $5,000,000.

In connection with the consideration of this subject the board gave a hearing at its office in Washington on February 21, 1910, at which appeared Hon. S. B. Elkins and Hon. N. B. Scott, United States Senators; Hon. H. C. Woodyard, Gov. White, and Mr. Mathews, and on March 29, 1910, a public hearing was held in Parkersburg, W. Va. On March 30 an inspection of the river was made from its mouth into Pool No. 5, and on the 31st of a portion of the upper river in the vicinity of Burnsville.

On account of the great cost of the project proposed by the district officer, and statements made by interested parties to the effect that a traffic of considerable magnitude would develop from the extension of slack-water improvement to Burnsville, even if the present system from the mouth to Creston was not modified, and with a view to securing all information that would throw light upon the advisability of the further improvement of this river, the board requested the district officer to prepare a project of less scope than that recommended by him. It suggested the omission of Locks 1 to 5 for the present, and also of numbers 14 and 15 at the upper end of the proposed improvement, as it appeared that Pool 13 would extend sufficiently into the Pittsburgh field to determine whether such a traffic in coal would develop as to render further extension advisable.

Under date of May 23, 1911, the district officer submitted a supplemental report on the modified plan, from which it appears that by retaining the 5 existing locks and dams, omitting numbers 14 and 15 originally proposed, and by replacing the 8 locks and dams,

Digitized by Google

6 to 13, inclusive, as originally proposed by 6 dams of higher lift, the improvement would cost $1,702,968, including $274,690 for a reservoir, and if replaced by 7 dams would cost $1,860,940, similarly including $221,616 for reservoir. The size of the locks proposed is 28 by 140 feet.

In connection with his further investigations, the district officer states that he made additional discharge observations and found the low-water flow to be 12.4 feet per second. This appears to confirm the low-water discharge taken in 1874, which was 12.5 cubic feet per second. The district officer states that this figure, being much below the low-water discharge assumed in his previous report, very materially affects the problem of the improvement of the river.

Allowing 25 per cent for leakage, evaporation, etc., there will be a natural low-water flow of but 9.3 feet available for lockages. On this basis it appears that for locks 28 by 140 feet the supply would be sufficient for only 14 lockages in 24 hours, and that in order to secure 3 lockages per hour, or 72 per day—a resonable number if the traffic is large—there would be required 38 feet per second in addition to the amount available, or nearly four times the actual. Provision for reservoir to supply this additional amount of water is made in the estimates as indicated in preceding paragraph. In view of the apparent infrequency of the occurrence of this extreme low water it would appear probable that the reservoir system could be omitted at least at first, reducing the estimates for plan A to $1,428,278, and of plan B to $1,639,324.

From the foregoing it will be seen that the most economical plan for slack watering this stream to the coal fields will cost about $1,500,000, and this will make available in the lower portion of the river only a 4-foot navigation through locks of such restricted size that a large traffic can not be expected to result. Experience indicates that it is not economically practicable to transport coal long distances on less than 6 feet, and even with that depth improvements have not always been successful.

The board has carefully considered this subject in all its phases. It is satisfied of the existence of large quantities of coal in the upper sections of this river. It does not believe, however, that there would be any prospect of getting this coal out by water with anything less than a complete new system of transportation, at a cost approximately four to five million dollars. It would be practicable to secure light draft navigation by the modified plan suggested at a cost of about $1,500,000, but this would be of little value, and in the opinion of the board would not result in benefits at all commensurate with the cost. The board is forced, therefore, to concur in the opinion of the division engineer that the Little Kanawha River is not worthy of further improvement at the present time.

The district officer describes existing wharves and terminal facilities, and attention is respectfully invited to his remarks on this subject. In compliance with law, the board reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

Digitized by Google

JPPLEMENTAL REPORT ON SURVEY OF LITTLE KANAWHA RIVER, W. VA.

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., May 23, 1911.

SIR: Referring to letter dated April 4, 1910, from the Board of ngineers for Rivers and Harbors to the Chief of Engineers, and to st indorsement thereon dated April 7, 1910, I have the honor to ibmit herewith the following supplemental report on the survey f the Little Kanawha River, with a view to its improvement. Preious report was submitted to the Chief of Engineers under date of anuary 31, 1910.

SURVEY.

A survey party was put into the field during the summer of 1910, xtending the 1909 survey of the river up all tributaries and over ie full length of the original survey up the banks to an elevation of t least 1 foot above extreme high water in the main stream. From ilenville down a new low-water record was discovered, considerably elow that given in the maps of the preceding year's survey. Above ilenville the river was assumed to have extreme low water correpondingly lower than was assumed last year, although the survey arty was not in that stretch of river at the time of lowest water. ites were selected after preliminary borings for two new series of ocks and dams above Lock and Dam No. 5; and surveys of the site nd borings were made at each lock and dam location. The inforiation obtained in this new survey was combined with that obtained i the survey of 1909.

One blue print of each of the 67 drawings [1] is submitted herewith, he file numbers being LK16/1 to 65, and 67 and 68. In addition, lue print LK16/69 [2] is attached to Appendix A.

PROJECTS.

The two new projects drawn up replace the eight dams, Nos. 6 to 3, inclusive, given in the old project (project in my original report f January 31, 1910, on the Little Kanawha River survey), by a ewer number with greater lift. In project "A" the number has been educed to six, and in project "B" to seven. In each project the ppermost pool has the same elevation as pool 13 in the old project.

In the following tables the locations, length of pool, etc., are given or each project.

TABLE I.—*Project A.*

Dam No.	Station on map.	Length of pool.	Elevation lower pool.	Elevation upper pool.	Lift.	Length of crest.	Elevation of crest above low water.
		Miles.			*Feet.*	*Feet.*	*Feet.*
.....	3996+15	11.61	625.2	640.6	15.4	220	18.6
.....	3383+10	10.9	640.6	656.0	15.4	185	20.9
.....	2807+53	11.64	656.0	671.4	15.4	165	22.1
.....	2192+71	7.61	671.4	686.8	15.4	185	19.9
0.....	1790+60	14.3	686.8	702.4	15.6	230	21.2
1.....	1033+70	8.3	702.4	718.0	15.6	160	20.0

[1] Only 5 of these drawings (LK 16/51-53, 65 and 68) printed. [2] Not printed.

Digitized by Google

TABLE II.—*Project B.*

Dam No.	Station on map.	Length of pool.	Elevation lower pool.	Elevation upper pool.	Lift.	Length of crest.	Elevation of crest above low water
		Miles.			*Feet.*	*Feet.*	*Feet.*
6	3996+15	9.6	625.2	639.0	13.8	220	
7	3493+20	8.51	639.0	652.8	13.8	185	
8	3044+65	13.2	652.8	666.0	13.2	175	
9	2348+16	5.6	666.0	679.0	13.0	165	
10	2052+65	10.25	679.0	692.0	13.0	160	
11	1511+05	9.1	692.0	705.0	13.0	163	
12	1033+70	8.3	705.0	718.0	13.0	160	

The dams are located on sheets[1] LK16/11, 17, 22, 25, 26, 28, 35, 38, 39, and 50, as indicated by red lines on the blue prints. They are also shown on the profiles, LK16/51, 52, and 53. In the profiles commonly more than 6 feet of water are shown in the upper reaches of the pool, but the river is so narrow and tortuous in the upper part that 6 feet above low water hardly gives wide enough channel. The survey of the sites are drawings[1] LK16/54 to 64, inclusive, which show the locks and dams in outline. As the river is small and the lock naturally takes up a large percentage of the cross section, it, as well as the abutment, was forced well into the bank.

Drawing LK16/68 gives a typical lock, dam, and abutment as used in making estimates for these projects. The lock chambers are 28 feet by 140 feet in the clear to accommodate a barge 26 feet by 135 feet. They have been located with a view to extending the lock chamber downstream to give a chamber 28 feet by 280 feet. A study of gauge records and local conditions resulted in the selection of lock walls with an 8-foot guard, except lower guide walls, which have a 12-foot guard. Short upper and lower guide walls 50 feet long were selected with a view to reducing the cost. The dam was designed of crib work with the top of the crib 15 inches below pool level, with flashboards 15 inches high. On the upstream side of the crib is a thin wall of concrete 1 foot thick to make it water tight, as used heretofore on this river. A concrete dam was also designed for purposes of comparison.

The above-described structures are in most cases on rock. All concrete dams rest on rock and all crib dams, except one, are on rock. In that case a crib below the dam rests on rock.

The estimates are shown on drawing LK16/67,[1] which also gives comparative costs with concrete and with crib dams. In connection with the unit costs assumed, attention is called to the lack of all transportation facilities over the part of the river to be improved, there being no railroad in this section. The Little Kanawha River itself is not capable of transporting even a canoe over the rapids during low water.

The concrete dams are made 30 feet thick. They attain a maximum height of 38 feet above rock foundation. If desired, such sections could be anchored by bolts to the foundation. The calculations made in this office indicate they are safe without such bolts.

[1] Not printed.

Digitized by Google

LAND FLOODED.

The following study was made of the extra cost due to decreasing ıe number of dams and increasing the lift of each one. Tables III nd IV were prepared from daily gauge records for the years of 1903 › 1910, inclusive.

'ABLE III.—*Showing the average number of days each month when the upper pool is at or above various stages on the crest of the dam at Dam No. 5, Little Kanawha River.*

Month.	Height above crest of dam.									
	1 foot.	2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
'anuary	17.9	9.8	6.0	4.6	3.3	2.3	2.0	0.6	0.5	0.4
'ebruary	17.8	8.6	6.0	3.0	2.5	2.0	1.1	.6	.1	.1
'arch	21.8	11.0	7.3	4.6	3.3	2.0	1.5	.8	.6	.4
April	19.1	8.0	3.6	2.4	1.5	.8	.3	.....	.....	.....
May	12.0	5.1	2.8	1.8	1.0	.8	.6	.5	.3	.1
June	9.0	3.6	1.8	.8	.6	.5	.3	.....	.....	.....
July	8.5	3.3	.5	.3	.....	.....	.....	.....	.....	.....
August	5.3	3.0	1.1	.3	.3	.3	.1	.1	.....	.....
September	1.5	.5	.3	.3	.1	.1	.1	.....	.....	.....
October	3.0	1.0	.5	.1	.1	.1	.....	.....	.....	.....
November	3.3	1.3	.8	.5	.4	.3	.1	.....	.....	.....
December	9.5	4.5	2.4	1.3	.9	.4	.3	.1	.....	.....
Total	128.7	59.7	33.1	20.0	14.0	9.6	6.4	2.7	1.5	1.0

TABLE IV.—*Showing the average number of days each month when the river at Glenville is at or above various stages above low water.*

Month.	Stages above low water.							
	5 feet	6 feet.	7 feet.	8 feet.	10 feet.	12 feet.	14 feet.	20 feet.
January	4.4	3.6	3.5	3.0	1.4	1.0	0.6	0.3
February	3.0	2.1	1.6	1.4	.6	.4	.3	.....
March	4.5	3.8	3.0	2.1	1.8	1.2	.6	.1
April	2.1	1.5	1.1	.8	.4	.1	.....	.....
May	2.3	1.6	1.1	1.0	.5	.4	.3	.1
June	1.6	1.1	.8	.8	.6	.3	.3	.....
July	.8	.8	.5	.5	.3	.1	.1	.....
August	.8	.5	.5	.4	.3	.1	.1	.....
September	.3	.....	.....	.....	.....	.....	.....	.....
October	.6	.4	.4	.2	.2	.....	.....	.....
November	.9	.4	.3	.3	.3	.1	.....	.....
December	1.6	1.1	1.0	1.0	.5	.3	.1	.....
Total	22.9	16.9	13.8	11.5	6.9	4.0	2.4	.5

TABLE V.—*Conditions at site of uppermost dam at Glenville.*

Stage above low water, open river.	Discharge in cubic feet per second.	Height on crest of Glenville dam.	Number of days river is above corresponding stages.
Feet.		*Feet.*	
5	2,100	2.3	22.9
6	2,700	2.7	16.9
7	3,300	3.3	13.8
8	3,800	3.6	11.5
10	5,050	4.3	6.9
12	6,275	5.0	4.0
14	7,350	5.6	2.4
20	10,900	6.8	.5

Digitized by Google

The second column of the above table was taken from the discharge curve shown on drawing LK16/65. The figures in third column were computed from the corresponding discharge for the proposed Glenville Dam.

The fourth column was taken from the totals in Table II. A curve was constructed using Column 3 for abscissas and Column 4 for ordinates, and from this curve the number of days corresponding to heights of 2, 3, 4, 5, 6, and 7 feet on the crest of the dam were obtained. These heights and the corresponding heights from Table II give us Table VI.

TABLE VI.—*Showing the average number of days each year when the river at the Glenville Dam, at Dam No. 5, or in this section of the river, would be at or above various stages on the crest of the dam.*

	Height above crest of dam.								
	2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
Dam No. 5	59.7	33.1	20.0	14.0	9.6	6.4	2.7	1.6	[illegible]
Dam at Glenville	27.1	15.1	8.6	4.0	1.6	0.4	.....	.....	.....
Average for this section of river	43.4	24.1	14.3	9.0	5.6	3.4	1.4	0.8	[illegible]

The average for this section of the river is taken as a mean of the other two.

TABLE VII.—*Showing number of acres of land flooded at various depths of water on crest of dams for different projects.*

	Elevation above crest of dam.								
	1.2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
Number of acres flooded, project A	104	160	220	353	470	586	702	818	[illegible]
Number of acres flooded, project B	83	141	205	297	402	506	611	716	[illegible]
Number of acres flooded, old project	63	128	171	234	317	401	484	576	[illegible]

The elevation of 1.2 feet above crest gives the normal pool elevation, the flashboards being 15 inches or 1.2 feet high. In computing the acreage flooded the surface of the pools was supposed to be horizontal at normal pool. For greater depths over the crest of the dam the surface of the pool was supposed to be sloped, the pool at its upper end being 1¾ feet above normal for each foot above normal at the lower end of the pool. The land above the bank only was included in the above acreages, the United States having the right to flood that below the bank when the top of bank is below ordinary high water. This situation regarding the height of bank generally obtains on the Little Kanawha River. The areas were taken with a planimeter from the maps of the survey, and on account of the scale of the survey can not be considered very accurate.

The difference in land flooded between project A and the old project and also the difference between project B and the old project are as follows:

Digitized by Google

TABLE VIII.

	Elevation above crest of dam.								
	1.2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
ıcreased number of acres flooded, project A.....	41	32	49	119	153	185	218	242	285
ıcreased number of acres flooded, project B.....	23	13	34	63	85	105	127	140	171

The cost, expressed in thousands of dollars, of extra land flooded, stimated at the rate of $300 an acre, over that flooded in old project s as follows:

TABLE IX.

	Elevation above crest of dam.								
	1.2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
ıxtra cost, project A.....	12	10	15	36	46	56	65	73	86
ıxtra cost, project B.....	7	4	10	19	26	32	38	42	51

It is not believed that this land is worth $300 an acre, but if purhased by the Government it might very easily be bought at that rate, r even higher.

The extra cost of flooding lands for either projects A or B for the arious heights on the crest of the dam can be obtained from Table X, while Table VI will give some idea of the number of days each ear that the different depths will be maintained over the crests of he dams. The extreme flood at Glenville is about 32 feet above ow water. The river maintains about the same extreme flood elevaions through the section considered. From Tables I and II we see hat the elevations of crests of the dams above low water average bout 20 feet, so that at the dam in the case of extreme high water here will probably be about 12 or 13 feet over the crest, there being o great difference between the height of extreme flood with or withut the dams, judged from records at Dam No. 5. Tables V and IX ere not computed for an elevation of more than 10 feet on the rests, as floods above that height are not common. The costs in Table IX refer to land flooded principally in the lower ends of the ools.

I have been at a loss as to what stage of the river to assume in btaining the cost of extra land flooded, and Tables VI and IX were repared so that the Chief of Engineers and the Board of Engineers ould have some information before them. I have assumed the 10-foot stage over the crest, or $86,000 and $51,000, as the increased osts of projects A and B, respectively, due to flooded land over that f the old project.

No detailed study was made of the project with fewer than six ocks for this stage of the river. Five locks would mean an average ift of 18.6 feet, and four locks would mean an average lift of 23.2 eet. A cursory examination made either of these systems seem ndesirable and details were not made therefor on account of funds

Digitized by Google

and time involved. In projects A and B the dams are as high as the water during an open river flood stage. At the Glenville Dam, for example, this stage is reached in the open river only once in two years. (See Table IV.)

DISCHARGE OBSERVATIONS.

A number of discharge observations have been made as shown on drawing LK16/65. During an inspection of the river Mr. Wm. M. Hall, assistant engineer, Mr. W. N. Dambach, junior engineer, and I made a discharge observation at Glenville October 18, 1910, obtaining a low-water discharge of 12.4 cubic feet per second. This is much below the low-water discharge assumed in my previous report and very materially affects the problem of the improvement of the river. The details of the making of this observation will be found in Appendix A. Glenville being in the uppermost pool, it is assumed that if the water is sufficient at Glenville, it will be sufficient throughout the river. Allowing 25 per cent loss for leakage, evaporation, etc., there will be a net discharge of 9.3 feet.

TABLE X.—*Showing number of lockages possible with low-water discharge.*

Project.	Size of lock chamber.	Low-water discharge.	Decrease for leakage, etc.	Water available.	Number of lockages possible in 24 hours
A 15½ lift	140 by 28	12.4 cubic feet per second.	3.1 cubic feet per second.	9.3 cubic feet per second.	[illegible]
Do	280 by 28	do	do	do	[illegible]
B 13 lift	140 by 28	do	do	do	[illegible]
Do	280 by 28	do	do	do	[illegible]

Assuming that enough water was desired to furnish 3 lockages per hour, or 72 per day, Table XI was prepared to find out how much water would be required.

TABLE XI.—*Showing water required to make three lockages per hour.*

Project.	Size of lock chamber.	Water required per lockage.	Water required per second.	Water required in excess of 9.3 cubic feet.
		Cubic feet.	*Cubic feet.*	*Cubic feet*
A 15½ lift	140 by 28	67,704	56.4	[illegible]
A 15½ lift	280 by 28	128,464	107.1	[illegible]
B 13 lift	140 by 28	56,784	47.3	[illegible]
B 13 lift	280 by 28	107,744	89.8	[illegible]

It was assumed that storage for three months with water at extreme low stage would be ample for any season. The cost of constructing reservoirs was taken as $750 per million cubic feet of water stored. The upper watershed of this river has many favorable reservoir sites. From the above assumptions storage would cost as follows:

Project A, small locks	$274,[illegible]
Project B, small locks	221,[illegible]
Project A, extension	295,[illegible]
Project B, extension	247,[illegible]

The above amounts have been added to the estimates of cost.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

House Doc. No. 480 ; 62d Cong., 2d Sess.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

House Doc. No. 450; 62d Cong., 2d Sess

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

MOVABLE CREST OF DAM.

Due to the small amount of water available, a movable dam of the Chanoine, needle, bear-trap, or similar type would hardly be feasible on this river. If used, extra storage of water would be required. Their cost of operation is much greater, and repairs are much more frequent than with fixed concrete dams. The movable dams on the Kanawha River cost about $10,000 a year each to operate while the fixed dams on the Little Kanawha cost about $2,000 or $3,000 each. The movable dam on the Little Kanawha would cost probably $5,000 or $6,000 extra each year which, capitalized at 2½ per cent, alone equals $200,000 to $240,000. This river is small and has very sudden rises and falls which would operate against the movable dams, except the bear-trap, which is almost prohibitive in cost, or possibly the Chanoine Dam, which would be difficult to operate. If used, it should be built to stand 2 or 3 feet over the crest (which is 3.2 or 4.2 as used for crest in Table VII), and as pools of movable dams with little or nothing over the crest may be much more sloped than fixed-dam pools, it is seen that the land flooded would probably correspond to 4 or 5 feet over the crest in Table VII.

From the height of these dams, even with a long wicket, there would be a tolerably high dam left for the fixed portion. It is difficult to determine the land flooded with fixed dams, but the difference between that flooded with fixed and movable dams is still greater. Movable dams or movable crests, except of the kind proposed, are not considered advisable.

The flashboards proposed are 15 inches high and have been used heretofore on the Little Kanawha River, and leakage through them was found to be very small. However, in 1910 it was not possible to keep pools everywhere full to the top of the flashboards, even where the dam had a 1-foot wall of concrete on the upstream side, such as was suggested by the Board of Engineers in its letter of April 4, 1910, for the new work.

Respectfully submitted.

F. W. ALTSTAETTER,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer).

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF THE DIVISION ENGINEER,
CENTRAL DIVISION,
Pittsburgh, Pa., May 25, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

This supplemental report on the survey of the Little Kanawha River appears to give all of the additional information called for by the Board of Engineers for Rivers and Harbors in its letter of April 4, 1910, including also the reduction in size of locks directed by the Chief of Engineers. The original estimated cost of $5,000,000 contemplated the rebuilding of the five existing locks and dams and the construction of 10 additional locks and dams, using locks 54 by 280

Digitized by Google

feet for the first six above the mouth of the river, and 28 by 280 feet for the upper nine, concrete dams throughout, and 300-foot concrete guide walls in the upper and lower approaches. By retaining the five existing locks and dams, omitting Nos. 14 and 15 originally proposed replacing Nos. 6 to 13, inclusive, by six dams for project A and seven dams for project B, reducing the locks to 28 by 140 feet, and the guide walls to 50 feet in length, the estimate for the improvement becomes $1,702,968 for project A, and $1,860,940 for project B.

It appears that the main purpose of the proposed improvement is to provide water transportation for coal from the deposits found on the upper reaches of the river. The Government has already undertaken some extensive experimental improvements for similar purposes under natural conditions that are somewhat more favorable than those found on the Little Kanawha River. It is probable that a few years' experience with these other projects will show whether sufficient commerce will be developed to warrant the large expenditures required for canalization. In the meantime, it is believed that no further experiments should be undertaken, and I am therefore of the opinion that the Little Kanawha River is not worthy of further improvement at the present time.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

Digitized by Google

APPENDIX A.

DISCHARGE OBSERVATIONS.

The following is a description of the discharge observations taken October 18, 1910, at Glenville, W. Va., by Maj. F. W. Altstaetter, Wm. M. all, assistant engineer, and W. N. Dambach, junior engineer.

Drawing attached hereto (LK16/69)[1] shows a cross section of the river on October 18 at Station 1007 + 15, where the observation was taken, and also one section upstream, and one 303 feet downstream from that point. The maximum depth of the water where the observations were taken was 10½ inches, and the total width 25.5 feet. At this point the river was fairly uniform for a short distance up and downstream. The river was cleared of brush, etc. The bed of the river consisted of well compacted gravel and loam. It was impossible to use a current meter, and small pieces of wood were used as floats. At 3-foot intervals along the cross section slender stakes were put in the stream to be used in judging the point on the cross section where the float passed. Fifteen feet above and 15 feet below this section similar stakes were put on each side of the river to indicate other cross sections. The time of passage of the floats from the upper section to the lower section; that is, from a point 15 feet above station 1007 + 15 to a point 15 feet below that section was the course timed. Maj. Altstaetter, Mr. Hall, and Mr. Dambach each took time observations and also estimated the point on the cross section where the float passed. When there was any material difference in these estimates the observation was thrown out. One observer called out the time when the float passed the upper section, and time was similarly called out when the float passed the lower section.

The section 303 feet downstream is produced to show the presence of bed rock near to and below the section gauged, which would indicate that there was little flow of water below the bed of the river at that point, as it would have to return to the surface before it reached a point 303 feet downstream.

[Letter of Hon. S. B. Elkins.]

WASHINGTON, *March 26, 1910.*

GENTLEMEN: I heartily join the people of the various counties reached by the Little Kanawha River in urging the improvement of the Little Kanawha River and in setting forth briefly some of the reasons why it should be improved and made suitable for navigation and the transportation of coal and other products from the central part of the State to the markets down the Ohio River and on the Great Lakes.

Outside of the Ohio River, in one sense the Little Kanawha is the most important river in the State, because, if improved, the coal fields in Braxton and adjoining counties can be worked and the coal reach not only Parkersburg and intermediate points, but points on the Ohio and Mississippi Rivers, as well as on the Great Lakes, by way of Marietta and up the Muskingum River to the Dresden Canal.

Water transportation is much cheaper than rail transportation. Under present conditions, without railroad facilities, this vast field of coal, together with other products, is prevented from reaching the markets of the country.

The engineers have reported favorably heretofore on this project, and I regret it has been held up for a further investigation. Any depth of water obtained by way of improvement would afford the people great relief, and I believe under a proper system of locks and dams sufficient depth of water can be provided to transport all the coal and other products originating in the territory reached by the Little Kanawha River.

It is estimated there is more than 1,000,000,000 tons of coal in the coal fields reached by and tributary to the Little Kanawha River. The timber is enormous in the counties through which the river runs. Parkersburg is one of the largest cities in the State and is destined to have a great future, to which one of the contributing causes will be the improvement of this river, which would bring coal to Parkersburg from 60 cents to $1 cheaper than it can now be brought by rail. This would encourage the location of large factories in and about the vicinity of Parkersburg.

[1] Not printed.

Digitized by Google

The outlet to the Lakes with this improvement would afford West Virginia coal and coke its greatest market, because the rapid settlement of this vast territory furnishes the best market for coal and coke, and cheap transportation would develop a very large traffic at once. The improvement would not only benefit West Virginia producers of coal and other products, but it would be a great help to Parkersburg with the harbor that Dam No. 19 makes for the city. It would not only benefit Marietta and all the towns on the Ohio River, but would furnish a cheap outlet for interior points in Ohio and to the Lakes and there be distributed to other sections of the country.

The improvement of the Little Kanawha River would have the effect of creating an enormous traffic, besides keeping down the rates on the railroads, which is very desirable. I believe the traffic which would be moved on the Little Kanawha River, if improved, would exceed that of any other river in the State.

During a long service on the Interstate Commerce Committee of the Senate of nearly 15 years I have been familiar with the improvement of waterways throughout the United States, and know of no project for the improvement of any river which has more merit than that of the Little Kanawha.

Very truly, yours,

S. B. ELKINS.

To the BOARD OF ENGINEERS,
In Session at Parkersburg, W. Va.

[Letter of the Board of Commerce of Parkersburg, W. Va.]

PARKERSBURG, W. VA., *March 29, 1910.*

GENTLEMEN: The Parkersburg Board of Commerce earnestly indorses the proposed improvement by the United States Government of the Little Kanawha River from Palestine to Burnsville, with locks and dams of sufficient size to admit the passage of standard coal barges, and with sufficient depth to the channel, for the following reasons:

1. It is the only method available of reaching one of the largest and best undeveloped (Pittsburgh coal measure) coal fields in the United States, thus insuring a large tonnage for transportation. It is conservatively estimated that the field immediately tributary to this river, which could easily be mined and transported there, will produce in excess of a billion tons of coal.

2. The Little Kanawha drains six important counties in West Virginia with large population, good agricultural resources, splendid timber, and in several, large mineral wealth, including coal, oil, gas, clays, etc., and with a flourishing trade which could and would be handled by river. It is in many respects the most important river in the State, and has been locked and dammed one-third of the distance, showing thereby that its improvement is entirely practicable and with extension would open up an enormous traffic.

3. Such an improvement means a continuous water way from the Gilmer County and Braxton County coal fields to the South via the Ohio and Mississippi Rivers and what is of more importance, the prompt establishment of a through water way from the West Virginia coal fields via the Muskingum River and the Dresden Canal to the Lakes. The establishment of the latter route means a marked benefit to the coal shippers of West Virginia, because of better freight rates to the Lakes from points which would follow, thus benefiting the markets of not only West Virginia and Ohio, but all the Northwest reached by the lake trade.

4. It means the building up of the cities of the Little Kanawha and Muskingum Valleys, because of cheaper fuel supplies, and will benefit Zanesville, McConnelsville, Marietta, Parkersburg, and other cities very much. It will stimulate manufacturing and civic growth.

5. The direct benefits are so far-reaching that they can not easily be overestimated, while the indirect benefits are so wide in their scope as to railroad-rate regulation, etc., as to need only to be mentioned to compel the conviction that this great public improvement will be amply justified.

6. The improvement as proposed of the Little Kanawha River will bring about the extension of railroad facilities along the Little Kanawha for which the people of the valley have been working for a quarter of a century, and which development is so tied up by a "community of interests" as to be for the present an "iridescent dream" until the United States Government affords relief by river transportation.

For these and many other reasons the board of commerce, speaking for the business interests of Parkersburg as well as those of the entire Little Kanawha and Muskingum

Digitized by Google

Valleys, respectfully urges the necessity for and assured success of such an improvement of the Little Kanawha River as will bring its great mineral deposits into the markets of the West, South, and Northwest.

On behalf of the board of commerce.

ALBERT B. WHITE, *President.*

To the BOARD OF ENGINEERS,
In Session at Parkersburg, W. Va.

[Resolution of the citizens of Gilmer and Calhoun Counties.]

Whereas, the continued and systematic improvement of the navigable waterways of our country, under supervision of United States engineers, is essential to the further development of the inland and foreign commerce of the United States; and

Whereas, the Congress of the United States, appreciating the vast importance of our internal waterways as a necessary factor in the achievement of our manifest destiny; the industrial empire of the world, have already taken the preliminary steps to wonderfully improve the Ohio and Mississippi Rivers and their tributaries, as commercial channels of the United States; and

Whereas, the inevitable result of such improvement of our internal waterways must be of the greatest importance and benefit to the State of West Virginia, in connection with the United States at large; and

Whereas, it has heretofore been determined by the Government engineers that it is feasible and practicable to lock and dam the Little Kanawha River to Burnsville; and

Whereas, it has been ascertained by competent engineers and statisticians that there is more than 100,000 acres of merchantable coal in the Little Kanawha Valley, and that it would be a great national asset if water transportation was extended to this field; therefore

Be it resolved, by the citizens of Gilmer and Calhoun Counties, That we most sincerely commend the wisdom of the said legislation by the Congress of the United States, and urge upon it the imperative necessity for completion of the improvements contemplate as soon as compatible with their nature and importance; and

Resolved, further, That this improvement on the Little Kanawha River should be by the continuous-contract system; all of the locks and dams should be located at once, and work on all of them begun, so that within the next few years we could have slack water from Burnsville to Parkersburg; and

Be it further resolved, That copies of this resolution shall be sent to the Board of Engineers, that meet at Parkersburg March 29, 1910, and to our Representatives in Congress.

A. E. KENNEY, *Chairman.*
S. P. BELL, *Secretary.*

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 489.

PORTLAND HARBOR, ME.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF PORTLAND HARBOR, ME.

JANUARY 29, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 27, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 26th instant, together with copies of reports from Lieut. Col. W. E. Craighill, Corps of Engineers, dated February 17 and November 24, 1911, with map, on preliminary examination and survey, respectively, of Portland Harbor, Me., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 26, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated February 17 and November 24, 1911, with map, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination and survey, respectively, of Portland Harbor, Me., called for by the river and harbor act approved June 25, 1910.

Portland Harbor has heretofore been improved under projects adopted by Congress, as a result of which a depth of 30 feet at mean

Digitized by Google

low tide had been provided over a greater part of the harbor, includi the channel of entrance to Back Cove up to the Grand Trunk Railro bridge and Fore River as far as the Boston & Maine Railroad brid and Back Cove had been dredged to a depth of 12 feet at mean tide. The projects have been completed, but shoaling has occurr in certain portions of the inner channel and along the southerly sid the city of Portland, in the channel of approach to Back Cove, and the channel in Back Cove along the northerly side of the city.

The report on survey contains a plan for improvement designed meet the present needs of commerce, and contemplates increasing present 30-foot anchorage area to the eastward of the city by dredg about one-fifth of a square mile in area to a depth of 30 feet at mean low tide; dredging and rock excavation to a depth of 14 feet betw Grand Trunk and Tukeys Bridges; the restoration of the channe Back Cove to a depth of 12 feet, including a slight widening at t bend; the restoration, by dredging, of the depth of 30 feet in the u channel, and of a similar depth in the channel of approach to Ba Cove up to the Grand Trunk Railroad bridge. This work is estim to cost $460,000, with about $2,000 annually for maintenance, pr cipally in the Back Cove Channel; and the district officer recomme that it be undertaken by the United States and completed in t years, with an initial appropriation of $150,000, to be followed two others in about equal amounts.

These reports have been referred, as required by law, to the B of Engineers for Rivers and Harbors, to whose accompanying rep dated December 19, 1911, attention is invited. The recomme tions of the district officer are concurred in by the division engi and by the board.

After due consideration of the above-mentioned reports, I co in general with the views of the district officer, the division engi and the Board of Engineers for Rivers and Harbors, and there in carrying out the instructions of Congress, I report as foll That the improvement by the United States of Portland Harbor, M is deemed advisable so far as to secure available harbor and cha depths as proposed by the district officer, following in general methods described in his report, at an estimated cost of $46 for first construction and $2,000 annually for maintenance, t estimates being based on the supposition that the construction will, as now seems desirable and advantageous, be prosecuted u a first appropriation of $150,000 and subsequent appropriatio about $150,000 per year for two years.

Very respectfully,

EDW. BURR,
Acting Chief of Engineer

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF PORTLAND HARBOR, ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., February 17, 191

SIR: I have the honor to submit the following report on a prel nary examination of Portland Harbor, Me., made under the requ ments of the river and harbor act of June 25, 1910.

Geographical.—The city of Portland, or that portion along the fr of which shipping is conducted, is located on a peninsula extendi

Digitized by Google

ı a northeasterly direction. Fore Fiver is on the southeasterly face f the city and forms the inner harbor of Portland. Two small :reams empty into Fore River, called Long Creek and Stroudwater .iver. They bring little or no silt into the harbor. The eastern front f the city is bordered by the waters of Casco Bay, while on the north-'esterly face there is a large shallow bay known as Back Cove, the reater part of which consists of flats exposed at low tide. Four ridges have been built across Fore River at the upper or western end f the city, viz, Portland Bridge, Boston & Maine Railroad bridge 'astern division), Vaughan Bridge, and Boston & Maine Railroad ridge (western division). There is practically no business and no ıannel improvement above the last one. The other three bridges ave draws operated by machinery and of widths sufficient for present eeds. Though of late years there has been a considerable develop-ıent above Portland Bridge, the bulk of the business is still below it. he entrance to Back Cove is crossed by two bridges—Grand Trunk .ailway bridge and Tukeys Bridge, the latter belonging to the city of ortland. There are modern draws in each of them, with openings f good width. The original depth at the entrance to the inner har-or, at the mouth of Fore River, was about 16 feet. The outer harbor deep, and the entrance from the sea is unobstructed by shoals, so ıat a natural channel sufficient for all present or probable future eeds extends nearly to the city.

Historical.—Up to the close of the fiscal year ending June 30, 1910, ıere had been expended on Portland Harbor by the National Govern-ıent for works of improvement the sum of $1,513,730.05. The first 'ork undertaken was the construction of a breakwater on the south-'ly side of the entrance, which was begun in 1836. Operations since ıat time, under various projects, have resulted in the dredging of a ide entrance to the inner harbor and of an area nearly 2,000 feet ide opposite the end of the breakwater, gradually narrowing to a idth of about 800 feet near the first bridge, all to a depth of 30 feet ; mean low tide. From thence a channel has been dredged about)0 feet wide, and to the same depth of 30 feet, up to the fourth bridge. channel 300 feet wide and 30 feet deep at mean low tide has also ›en dredged up to the Grand Trunk Railway bridge at the entrance › Back Cove, while within the cove itself there has been made a ıannel 300 feet wide and 12 feet deep at mean low tide for a distance about 5,600 feet, following the Harbor Commissioners' line along ıe northern side of the city, to the head of the cove. All work here-fore projected for Portland Harbor has now been completed.

Commercial statistics.—The collection of commercial statistics for ›rtland Harbor for the calendar year 1910 has not yet been com-eted and will not be available in time for the use of this report, but › radical changes have occurred during the year and it is not ex-ıcted that they will greatly differ from those of the calendar year)09. These statistics were collected with care and are believed to be liable. They are set forth in detail in the Annual Report of the ıief of Engineers for 1910 (p. 1095). The total business amounted 2,956,011 short tons (2,000 lbs.). The principal items were coal, ıich amounted to 1,632,882 tons; general merchandise amounting 425,162 tons; and grain, flour, and hay amounting to 255,425 tons. r purposes of comparison I can not go further back than 1892, as fore that year the statistics were in irregular form. In that year

Digitized by Google

the tonnage amounted to about 1,400,000 tons. Business has shown a steady increase since that date. There is no satisfactory way of arriving at the tonnage of the great number of vessels seeking Portland Harbor for refuge only.

Originally the commerce of Portland was conducted in light-draft vessels. There was an extensive West India trade carried on in small brigs, importing sugar and molasses and exporting lumber, cooperage and general merchandise, besides the fishing industry, which flourished many years ago, but which, while still large, is no longer so important. With the abandonment of the sugar refinery formerly located at Portland and with the concentration of foreign business at the larger ports, which afford better markets, Portland has lost much of this trade, but has more than made up the difference by increases in other directions. The coal business has expanded greatly, due not only to the increase in local consumption, but to other factors, one of which is the development of water power in the State, which has called for more coal to supply the steam power kept in reserve for use when the water supply is insufficient. The demand for coal for steam for heating, for dye vats, and other commercial purposes has also largely increased. While some development or improvement in the way of water storage for power purposes has been attempted and more is contemplated, it still follows that the demand for coal to prevent interruption of service and for other purposes will still further increase.

In former years it was the practice for the small vessels then in use to bring coal from the southern ports and return with cargoes of ice from the Kennebec River. With cargo both ways the freight rate of both ice and coal was reduced to a minimum. The monopoly of the ice interest and growth of the manufacture of artificial ice has caused the ice crop of Maine to be no longer so important. While but a few years ago as high as 1,000,000 tons per annum were shipped out of the Kennebec River, the amount has in more recent years been reduced to as low as 100,000 tons. With the return cargo eliminated, vessels have to be sent back to the coal ports light, and coal rates must be such as to meet the expense of the entire round trip. To meet this difficulty as well as sharp competition by the railroads, larger vessels have been built, and the size has been constantly increasing until now the most favored class of vessel proper for soft-coal carriers in this trade are the large six-masted schooners. Some of these carry as high as 6,000 tons in a single cargo, and having steam to hoist the sails and anchors, are at a minimum expense for crew. It is the practice to hire the crew for the trip only, and as soon as the vessel arrives in port with a cargo the crew is discharged and a new crew hired when the vessel is unloaded and ready again to proceed to sea. The average draft of these vessels is feet loaded, and some draw 28 feet. The economy in these large ships has been such that, at 75 cents per ton from Norfolk to Portland, it is stated that the largest schooners are able to make fair profits. Competition along this line is still going on and promises to continue with further economy as a result. One of the leading coal merchants of Portland has stated that in his opinion it will be but a short time before the use of even these large schooners will be abandoned and that a type of barge capable of carrying from eight to twelve thousand tons at a cargo and towed by large tugs will be

Digitized by Google

ubstituted, with a view to still further decreasing rates on bitumi-
ıous coal from the Chesapeake ports.

Aside from the foreign business (chiefly trans-Atlantic), which is
;iven in more detail in paragraph 6 [last paragraph on this page] of
his report, the principal regular steamboat transportation lines oper-
.ting in Portland Harbor are:

Maine Steamship Co., which runs a triweekly steamer to and from
New York City, except during the summer months when the service
s practically doubled.

Eastern Steamship Co., which runs a daily steamer to and from
Boston, a line of steamers which ply between Boston and the provinces
ouching each way at Portland, and a line of smaller steamers between
Portland and Maine ports to the eastward.

Portland & Boothbay Steamboat Co., which maintains a steamer
unning between Portland and Boothbay Harbor and other points.

Maine Coast Transportation Co., which runs a line between Boston
and Machiasport, touching at Portland.

Besides the above there are several smaller local lines, ferries, etc.
In the way of railroads, Portland is served by the Boston & Maine
Railroad with three separate lines; by the Maine Central with two
ines; and by the Grand Trunk Railway system, which uses Port-
and extensively as a winter port. The total railroad tonnage for
the calendar year 1910 was 2,898,437 tons. This does not include
through business between other points, passing through Portland
yards en route.

Present demands and needs.—From interviews with prominent
citizens, with members of the harbor commission, and from statements
of members of the board of trade with whom I have been in com-
munication, the following improvements have been considered:

(*a*) An increase in the project depth of 30 feet in the main channel and harbor of Portland.
(*b*) Increased anchorage area, particularly for heavy draft ships.
(*c*) Increase in the project depth of 12 feet in Back Cove Channel.
(*d*) The removal of obstructions in the channel of approach to Back Cove, between the Grand Trunk and Tukeys bridges.
(*e*) A further widening of the deep-water area of the main harbor.

The demand for an increase of depth in the main harbor comes from the interests representing the Transatlantic Steamship service. The Grand Trunk Railway of Canada has extensive terminal facilities in the lower part of Portland Harbor. Some use is made of these terminals throughout the year, but the greater part of the business is done during the winter months. After the St. Lawrence River is closed by ice much of the business via steamship from Montreal is transferred to Portland. Beside extensive railroad yards and docks there are two large grain elevators in the Grand Trunk yards having a combined capacity of 2,500,000 bushels. While these are operated by the Grand Trunk Railway in the conduct of its business, the elevators themselves were built with local American capital. The steamship sailings during the calendar year just closed were 100, of which 6 were during the summer season and 94 during the period when the St. Lawrence River was closed to navigation. Twenty-four of these sailings were for Liverpool, 10 for Glasgow, 15 for London, 10 for Bristol, and the remainder for various ports. The total outbound freight amounted to 277,568 tons and 13,235 cattle, and the total

Digitized by Google

inbound to 211,421 tons. During the same period the outbound passengers numbered 1,052 and the inbound 6,014. These vessels dr from 23 to 27 feet loaded—a few have a possible maximum drai great as 32 feet—and it is claimed by the interests representing t that the present depth of 30 feet at mean low tide is not suffic There is a demand also by this interest to be allowed to extend wharves further out into the harbor, as their docks are not sufficie long to permit handling the longest ships now entering the servic

The next claim for improvement arises from the demand for creased anchorage area for heavy draft vessels. The present anc age for deep-draft ships lies between Fort Gorges and the eastern of Portland. It is defined by regulations of the harbor board as lows:

RULE III. Vessels exceeding 500 tons shall be anchored easterly of a line d from the southeasterly end of the Portland Co.'s wharf as now built and the w end of the Bay View Wharf at Peaks Island. This line shall be marked by a w buoy off the eastern end of House Island.

The large coal schooners are 300 feet or more in length betw perpendiculars and require a large circle in which to swing, and, e by taking advantage of all other available space for smaller c there is not room in the anchorage at times. There are someti as many as 15 or more 5 and 6 masted schooners and large barg anchor at one time, loaded with 55,000 tons of coal. One concer Portland operates 34 schooners (3, 4, 5, and 6 masted) of a comb freighting capacity of 107,000 tons of coal. Besides the usual p senger business in and out of the port during the season, the nu of summer visitors to Portland and its neighborhood is very la The passenger business on the regular lines is large, and the pre of so many summer visitors involves a large amount of water tr to and from the islands in Portland Harbor and to points on neighboring shores, carried in ferryboats and small craft. Dur the year 1910 the number of passengers by water, of which the official record, was 1,480,275, exclusive of those carried on tra Atlantic steamers. The real number was somewhat in excess of t above, as a considerable number was not recorded at Portla Where the lives of so many passengers are involved it is more t ordinarily important that there should be no vessels anchored in fairway in order to prevent collisions, especially in times of the f quent fogs. The anchorage can be enlarged by dredging to the ea ward. It is believed that a sufficient depth can be obtained with encountering rock, and the shape of the basin must be arranged, only with regard to shelter and currents, but also so as to prov good holding ground by avoiding ledge excavation.

The channel in Back Cove serves at the present time to accom date certain industries located at the head of the channel. It w at one time expected that wharves would be built along the li of this channel to accommodate light-draft traffic; but that exp tation has not been realized. Business at the head of the chan however, is considerable. One company has a large pottery oc pying about 18 acres, with a water front of about 1,100 feet a wharves about 569 feet long facing the channel. Their princ business is the manufacture of salt-glazed sewer pipe. The t output is about 40,000 tons, amounting in value to $500,000 p year. A crew of about 225 men is employed the year around. The

Digitized by Google

ie about 45,000 short tons of clay and about 17,000 short tons of ›al per year, almost all of which comes by vessel. It is claimed ıat for some years there has been difficulty in getting vessels on :count of the shoal water in the Government channel. While the ıannel was originally dredged to 12 feet, which, with a tidal rise of bout 9 feet, would give about 21 feet at mean high tide, the chanel has shoaled in its upper part, and it is stated that there is now onsiderable difficulty in bringing in vessels drawing 18 feet.

There is also a coal and wood yard at this place doing a large usiness, and they make the same complaint of lack of depth. They rought in about 14,000 tons of coal by water last year.

The remaining industry at the head of the channel in Back Cove s the Portland Railroad Co., which has a power house with about .000 horsepower, intended to be increased to about 6,500 horsepower during the coming summer. This is the principal power plant of the railroad company, which is operating the entire street railway system of Portland and the surrounding territory within a radius of 15 miles. It is serving a population of about 100,000 and is carrying annually about 20,000,000 passengers. This company brings coal in by water in increasing quantities. The annual amount now is about 20,000 tons. Difficulty is had in getting vessels of satisfactory size through the Government channel.

Improvement of channel of approach to Back Cove.—Between the two bridges crossing the entrance to Back Cove the two points of rock projecting into the channel from either side should be taken off sufficiently to make the passage better. They not only make this part of the channel difficult, but are liable to cause damage to vessels grounding on them. Aside from this it is claimed by the Cash Fuel Co., which has a wharf on the shore at that place, that they have been unable to get into their docks with vessels of a draft of over 20 feet because of this obstruction. This means that through inability to bring in good-sized vessels they have been put to additional expense of about 10 cents per ton on about 10,000 tons of bituminous coal annually. This concern further states that in a recent case, through their inability to get a vessel over the shoal, they were obliged to discharge at another point and haul part of the cargo into their yard at an additional cost of about $500. About 18 months ago a large schooner grounded on this shoal, laid there two days, and when gotten off had to have repairs costing about $4,000. It is considered as fortunate that the damage was no greater.

Widening the deep-water area of the main harbor.—The need for widening the deep-water area of the main harbor by dredging on the southerly, or South Portland side, is represented to be needed, not only with a view to increasing the area available for anchorage but in order to permit the wharves being extended from the South Portland side nearer to deep water. The southerly side of the harbor is being developed and the owners of property are now beginning to look ahead with a view to getting greater depth up to their wharves. The southerly line of the deepened area is about 325 feet outside of the harbor line at its nearest point. It would be impracticable to extend the wharves this entire distance even if it were permitted, and the demand has already arisen for deeper water nearer to the wharves. In connection with this matter there is a desire on the part of certain wharf owners on the Portland side to extend farther into the

Digitized by Google

harbor, beyond the harbor commissioners' line, with the contention that this encroachment would be compensated for by widening on the opposite side.

Terminal facilities and water front.—While the chart of Portland Harbor shows numerous long and commodious wharves, in reality only a few of these wharves are available for present-day commerce. Beginning at the eastern end of the city on the main harbor front there are two wharves known as the Great Eastern Wharves. These are in a condition of disrepair and are not now regarded as available for any practical use. The next wharf, the Portland Co. Wharf, stands back from the harbor line and is used only for repairing small vessels. The next three wharves, which have been rebuilt within a few years and which afford fine terminal facilities, belong to the Grand Trunk Railway Co. It is claimed by this company that steamers are so rapidly increasing in length that their dock length of 500 feet is no longer sufficient and they desire to extend their wharves beyond the harbor line. The next wharf is Galt Wharf, owned by the Grand Trunk Railway, but not made much use of. Franklin Wharf, which comes next, is used by the Maine Steamship Co., which runs a line of steamers to New York, and by the Eastern Steamship Co., not only for the daily Boston boats but also for boats running from Portland to the eastward. There is no doubt that this wharf is insufficient in dimensions to meet all these demands. The next wharf is occupied by Randall & McAllister Co., extensive coal dealers. The next above this is Custom House Wharf, a good wharf, but without great depth of water. Portland Pier, the next above, is much used for local traffic and has a ferry slip. There is good water at the outer end, but the inner ends of the slips are shoal. From thence up to the coal-handling plant of the Maine Central Railroad just below Portland Bridge, the wharves are old and the slips very shallow, so that they can not be used for present-day commerce by vessels of a larger type. Many of the wharves are 1,000 feet and upward in length, but they were built in the days of light-draft vessels and it is unsafe to attempt to deepen the docks without rebuilding the wharves.

From Portland Bridge up, with the exception of the gas company's wharf, practically the entire front is controlled by the railroads, which are engaged in developing this property and are doing it thoroughly and systematically. Returning to the eastern end of the water front, after passing the wharf of the Portland Company practically the entire water front around to the Grand Trunk bridge is controlled by the Grand Trunk Railway, and nothing has ever been done toward its improvement or development. From thence following the shore of Back Cove, on the Portland side the entire front is in the hands of the railroads, and nothing has been done nor so far as I know, projected, except in the way of railroad freight yards.

Many of the old wharves on the main harbor side of Portland are occupied by junk dealers, lunch houses, and for storage, and it is my opinion that the development of the water front of Portland has not kept pace with the improvements provided by the National Government. That this is realized may be understood from the following quotation from a report of the harbor committee of the Portland Board of Trade, submitted at its annual meeting the early part of January, 1911.

Digitized by Google

It is the opinion of many whose judgment is entitled to respect that there can be o great improvement until the water front in whole or in part is taken over by the ity, as done in New York, Baltimore, and other cities. These men believe that a rharf built according to modern methods, that can not rot or burn, and spacious nough to accommodate large ships would be a good investment, besides being a great elp to this port.

The present harbor lines along the main front of Portland closely pproximates those established under authority of the State legisla- ure more than 50 years ago. Even at that early date the extension f wharves beyond the present harbor line was strongly opposed.

All work which has been heretofore done by the National Government t this locality lends itself to the future development of the harbor, nd nothing has been done that will not be a help toward any future xtension either in width or in depth. While congestion and lack of ccommodation may exist at some of the wharves, it is my opinion hat the remedy will lie in a development and better utilization of he wharf front rather than in the temporary expedient of allowing hese structures to go further out into the harbor. Just what that levelopment should be, or rather my opinion of it, is not understood o be a proper matter for discussion in this paper, except in so far as t relates to widening the harbor on the opposite side. While the erminal facilities of Portland Harbor have accommodated its com- nerce in the past, apparently the time has now arrived that some etterment is demanded, which should be provided either by the ocal government or by individual interests. A line of railroad track raverses the entire wharf front of Portland, and many of the wharves ave spur tracks, so that the question is simply one of revising or ebuilding some of the older wharves, a proposition which I believe nay be taken up seriously at no distant day. It is my judgment hat the congestion now existing at a few of the wharves can only e satisfactorily relieved by the development of some of the older wharf properties, and should not be allowed to be temporarily accom- nodated by an encroachment upon the harbor. The wharf front as already been pushed farward as far as it should be allowed to go. All the wharves over which coal is discharged have modern plants or unloading and storing coal by machinery. It is claimed that the ermanent coal handling plants have a combined capacity of 16,750 ons per day, though through delays in shifting vessels, etc., the ctual number of tons that can be handled is about two-thirds of hat amount. Besides the above, there are a number of floating oisters which are used at wharves where there is no permanent plant.

It is my opinion, after a study of the situation, and after consulta- ion with shippers and others interested in navigation, that Portland Harbor is worthy of improvement at present, to the extent of in- reasing the anchorage and improving the channel between the Grand Trunk and Tukeys Bridges, by removal of rock to present project depth, and by the restoration of the channel in Back Cove.

To determine the cost and prepare plans, a survey will be needed t an estimated cost of $3,500, and it is recommended that an allot- ment of that sum be made for the purpose.

There are no questions of waterpower development to be consid- ered in connection with the further improvement of Portland Har- bor, and it is doubtful if there will be any schemes for land reclama- tion. As early as 1854 a commission, consisting of Gen. Joseph G.

Digitized by Google

Totten, A. D. Bache, superintendent United States Coast Survey, and Commander Charles Henry Davis, United States Navy, recommended strongly in favor of retaining the entire tidal section of Portland Harbor and its basins. This idea has been strongly intrenched in the minds of some of the older citizens, who have the welfare of the harbor at heart, and it is doubtful if any proposition to reclaim fill any considerable portion of the flats would be consented to. The tendency is rather to deepen the entire area with a view to development and utilization of the harbor.

There are no wharves owned by the municipality, nor does the city own any water front on which wharves could be erected. There are a number of private wharves which are open to the public on equal terms, and there is sufficient front, if properly developed, to meet all probable demands. Most of the wharves have railroad tracks, so that transfer between rail and water is more or less readily accomplished. A number of important and expensive improvements have been made in recent years, and while complaint is made in some directions, it is my opinion that the situation affords ample opportunity for development to meet all demands, and that such development will occur when business needs become sufficiently great to warrant the expenditure.

Very respectfully, W. E. CRAIGHILL,
Lieutenant Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, February 21, 1911

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district engineer officer that Portland Harbor is worthy of improvement by the General Government to the extent stated within, and in his recommendation that the sum of $3,500 be allotted for the preparation of a plan of improvement and estimate of cost.

W. M. BLACK,
Colonel, Corps of Engineers, Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, March 6, 1911

Respectfully returned to the Chief of Engineers, United States Army.

In the within report on preliminary examination, the district officer has given consideration to the entire harbor of Portland, which at present consists of a deep anchorage area, a 30-foot channel along and above the main wharves in Fore River, a 30-foot channel around the eastern end of the city from the main channel to the Grand Trunk Railroad bridge at the entrance to Back Cove, and a channel 12 feet deep along the harbor commissioners' line in Back Cove to the head of the cove. There has been expended on this harbor by the General

Digitized by Google

Government about $1,513,000. All projects upon which work has been done are completed.

The commercial importance of the harbor is indicated by the following table, which shows a large and steadily increasing commerce:

	Tons.
1891	1,368,000
1900	2,261,000
1905	2,576,000
1909	2,956,000

The principal items are:

	Tons.
Coal	1,632,000
Grain, flour, and hay	255,000
General merchandise	425,000

Of the total commerce given above, approximately 500,000 tons is foreign, carried in vessels having generally a draft of 23 to 27 feet; a few have a possible maximum draft of 32 feet. The average draft of the large coal-carrying vessels is 26 feet, some drawing 28 feet.

The improvement considered is (*a*) an increase in the project depth of 30 feet in the main channel and harbor of Portland; (*b*) increased anchorage area, particularly for heavy draft ships; (*c*) increase in the project depth of 12 feet in Back Cove Channel; (*d*) the removal of obstructions in the channel of approach to Back Cove, between the Grand Trunk and Tukeys bridges; (*e*) a further widening of the deep-water area of the main harbor.

After full consideration of the several improvements mentioned, the district officer has arrived at the conclusion that Portland Harbor is worthy of further improvement to the extent of increasing the anchorage, improving the channel between the Grand Trunk and Tukeys bridges by the removal of certain rock obstructions to present project depth, and by the restoration of channel dimensions in Back Cove, this channel having shoaled to less than 12 feet. To determine the cost and prepare plans and estimates, he recommends a survey at an estimated cost of $3,500. The division engineer concurs in the views and recommendations of the district officer.

The demand for an increase in the depth of the main harbor is in the interests of the trans-Atlantic steamship service, it being claimed that the depth of 30 feet is insufficient. As shown above, there are very few vessels having a draft of 30 feet or over. The amount of commerce that can not be accommodated on 30 feet is very small compared with the probable cost of increasing the depth over the main channel, and this work is not believed to be advisable.

With reference to increased anchorage, it appears that the area available for this purpose is at times congested to the extent of encroaching upon the fairway used for passenger vessels, which in 1910 carried nearly 1,500,000 passengers. Additional anchorage area would therefore be of advantage and convenience to freight-carrying vessels and would add to the safety of a large number of passengers.

The channel in Back Cove has deteriorated, and the project depth of 12 feet at mean low water is not available. While business adjacent to this channel has not developed to the extent anticipated, there is considerable commerce, and difficulty is experienced on

Digitized by Google

account of insufficient depth. Additional improvement to a great depth than provided by the existing project does not appear to be justified, but the restoration of project dimensions is believed to be worthy of further consideration.

In the channel of approach to Back Cove between the two bridges crossing the entrance are two projecting points of rock which interfere with safe and convenient navigation. The removal of these rocks to project depth would be of advantage to commerce.

The widening of the deep water area in the main harbor is desirable both for the purpose of increasing the area for anchorage and to bring deep water nearer the wharves of South Portland, where with a moderate extension they would become more accessible. The request for increased width appears to be based in a measure upon a desire to improve wharf facilities on the Portland side of the channel by extending them beyond the harbor lines and compensation for the encroachment upon the channel by widening on the opposite side. The district officer's discussion on this subject indicates, however, that there is ample wharfage space available if properly developed and used and that increased channel width is not urgently needed.

After due consideration of all the facts, the board has formed the opinion that the improvement proposed by the district officer is all that is necessary to meet the reasonable demands of navigation at this time and that the advisability of the general Government undertaking the work is dependent upon its probable cost. The board therefore concurs in recommending that a survey and estimate be authorized.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, March 15, 1911

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Portland Harbor, Me., authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, United States Army

[Fifth indorsement.]

WAR DEPARTMENT, *March 16, 1911.*

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War

Digitized by Google

SURVEY OF PORTLAND HARBOR, ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., November 24, 1911.

SIR: I have the honor to submit the following report on a survey of Portland Harbor, Me.:

The order for this survey, or for further development of the question of additional improvement for Portland Harbor, Me., by the National Government, is based on a report of a preliminary examination submitted February 17, 1911, under the requirements of the river and harbor act of June 25, 1910.

The essential points suggested in that report as deserving investigation and in which respect Portland Harbor was regarded as worthy of improvement were:

Increasing the anchorage area.
Improvement of channel between Grand Trunk and Tukeys bridges.
Restoration of channel depth in Back Cove.

The field work of the survey was done during the past summer and the general results are shown on the accompanying tracing, on which is indicated also by shading the work which is recommended for a further improvement of the harbor.

INCREASING THE ANCHORAGE AREA.

The shaded area lying to the eastward of the city indicates the necessary dredging to provide a satisfactory anchorage area. This general locality is that now set aside by the municipal authorities for anchorage of heavy vessels, but the deep-water area is not sufficiently great to meet the demand. The result is that large vessels are frequently obliged to anchor in other places and obstruct the channel passages, which during times of fog involves serious risk to large numbers of passengers. The shaded area approximates one-fifth of a square mile and would afford anchorage for about 20 of the larger sailing vessels which trade to Portland. The material of the bed or bottom has been carefully examined, and it is confidently believed that a depth of 30 feet at mean low tide can be obtained without uncovering ledge or without coming sufficiently close to ledge to interfere with the holding qualities of the anchorage. The area indicated will doubtless meet all present and all probable demands for a considerable time and is about as large as it can be made without encountering ledge. It possesses the further advantage that if wharves for large seagoing vessels are ever established at the eastern end of the city, a subject which has been considered from time to time during the last 50 years and is not an unreasonable one, this area will not only form a convenient anchorage but will possess great value as a means of approach, thus lending itself to a comprehensive plan of improvement.

IMPROVEMENT OF CHANNEL BETWEEN GRAND TRUNK AND TUKEYS BRIDGES—ENTRANCE TO BACK COVE.

This is a portion of the harbor where no work has ever been done by the National Government. While the passage has always been more or less obstructed, it did not so much matter with light-draft vessels

Digitized by Google

in use years ago, but with the demand for cheaper freight rates on coal larger and larger vessels have been towed through, until now 1 feet is not an unusual draft, and 22 feet has been attempted. The result has been serious and with frequent damage. The survey of past summer shows several shoals over which the depth at mean low tide does not exceed 9 feet and an extensive shoal on the north side of the channel with considerably less water. With a mean range of tide of 8.9 feet this gives only about 18 feet over ledges, some which vessels must pass over, and others which they must run very close to, with probability of being carried onto them by current winds. The result is that such vessels can only be taken in on spring tides, when the depth at high water may reach 21 feet. A vessel drawing that depth has to be handled quickly on the top of the tide and if it strikes bottom must be pulled off immediately regardless of damage. To allow heavily laden vessels to rest on the rocky ledges or ridges during the fall of from 9 to 12 feet of tide would be to insure ruin of the craft. Therefore masters of vessels and of tugboats prefer to pull the vessel off the rocks, even if the keel has to be torn off. This is sometimes done, as many as four tugs being at work on a large sized schooner at one time.

Towboat captains will attempt to take the heavier vessels through if the masters of the vessels will assume responsibility. One is usually sufficient for the latter. After these vessels pass into the channel above Tukeys Bridge, where the depth at low tide is about the same or less, the case is not so serious, as they are in soft mud and with sufficient power can be dragged through 3 to 4 feet of it, and if grounded and obliged to lie over a tide they are on soft bottom. After consultation with the chief bridge engineer of the Grand Trunk Railway and with the commissioner of public works of the city of Portland, and learning that neither of those concerns contemplate or desire any change in the location of the draw openings of their bridges, I have taken the subject in hand with the towboat and coal people and have laid out a channel with a view to secure not less than 14 feet at mean low tide at this locality, along and affording greatest economy in construction, which, fortunately, is the same lines desired by the tugboat people, because of the set of the currents and it is stated by the tugboat master who has done most of the towing to Back Cove for a number of years the only one that can be used. The result of my investigations as to the difficulties of navigation between the two bridges has been such as to convince me even more strongly as to the necessity of work of improvement at this particular place. I regard this feature as the most urgent of any of those at present presented in the way of improvement.

RESTORATION OF CHANNEL DEPTH IN BACK COVE.

The survey indicates a general shoaling of from 2 to 4 feet in the channel in Back Cove, formerly dredged to 12 feet at mean low tide for a width of 300 feet. The original work at this locality was completed in 1898—13 years ago. As indicated in the report on the preliminary examination, the channel should be redredged to the proper depth of 12 feet at mean low tide, and I have provided at the same time for making it wider in the bend. It is difficult to point conclusively to any one factor which has caused the shoaling. At the head

Digitized by Google

of the channel a large sewer empties into the cove. The city dredges the accumulation from time to time and has done so for several years at an annual average cost of $925.

From the results of the survey I am led to believe that a great part at least of the shoaling is due to material washed in from the bank, which was originally from 1 to 2 feet above mean low tide. With a depth of 12 feet at mean low tide and a width of 300 feet, tugboats plying up and down the channel under full speed are probably in part responsible for the washing in and waves and currents and storms for the remainder. It is to be expected that deterioration in the future will not be greater than it has been in the past, and as the banks flatten I think it should be considerably less. Based on the shoaling during the past 13 years, the deterioration has been at the rate of about $2,500 per annum.

The survey has developed some shoaling in the channel of approach to Back Cove, dredged in 1907. There has been some reduction in depth along the southerly edge of the channel, and at one place a shoal of from 2 to 4 feet, extending entirely across the channel, was found. It was first assumed that this was due to the influence of Presumpscot River; but the opinion of the tugboat people is that it is due to changes in the bottom, caused by the propellers of the large steamers which have used that locality as a turning point in going out from the Grand Trunk coal pockets at Tukeys Bridge. My estimate of the cost of improvement includes the restoration of the project depth of 30 feet at mean low tide for this locality.

In the front or inner harbor the depth was found to have shoaled from 1 to 5 feet—that is, the present depth is that much less than the project depth of 30 feet at mean low tide heretofore secured.

The most serious shoaling has been on the southerly side of the harbor, in that area reserved by the authorities for anchorage for small vessels. As the characteristic depths over this area are 27 feet and more, I do not regard it as necessary at this time to attempt to do anything toward deepening, the existing depth being amply sufficient. In the portion of the harbor, however, used for passage it is my opinion that the matter of restoration of the channel depth should be included in the work now proposed to be done. The shoaling is not great, with one exception being rarely more than 2 feet, and is for a considerable part in small detached areas with deeper water surrounding them. The tugboat people explain this by stating that the lumps or ridges are thrown up by the propellers of deep-draft steamers in maneuvering the ships at or near low tide.

The estimated cost of doing the work above indicated is $460,000, and I think the project should be completed within three years, which will call for an initial appropriation of $150,000, followed by two others in about equal amounts.

As regards maintenance, I do not consider that the need for maintenance is definitely shown, except possibly in the case of Back Cove Channel, where the maintenance charge may amount to about $2,000 per annum. This, however, is an assumed amount, based on past experience and should be reduced rather than increased.

It is my opinion that Portland Harbor, Me., is worthy of improvement to the extent indicated above. No additional facts or arguments other than those conveyed by the report on the preliminary examination are advanced at this time except the general statement

Digitized by Google

that the opinion at that time expressed has, in the light of furth investigation and discussion, been confirmed and strengthened.

Very respectfully,

W. E. CRAIGHILL,
Lieutenant Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, November 29, 1911.

Respectfully forwarded to the Chief of Engineers, United Sta Army, concurring in the views of the district engineer officer.

S. W. ROESSLER,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 19, 1911.

Respectfully returned to the Chief of Engineers, United States Ar

A survey of Portland Harbor, Me., having been made in accorda with recommendations contained in the report on preliminary exa nation, the district officer presents a comprehensive plan of impro ment to meet the requirements of commerce and navigation at locality. The work proposed consists in increasing the pres anchorage area for deep-draft vessels opposite the eastern portion the city to a depth of 30 feet; dredging and rock excavation to depth of 14 feet between Grand Trunk and Tukeys bridges; restoration of the channel in Back Cove to a depth of 12 feet; redre ing the channel of approach to Back Cove to 30 feet in certain sp where shoaling has occurred; the restoration of the 30-foot de in the inner channel by redredging certain shoals and lumps, all a total estimated cost of $460,000.

To carry out this project, the district officer recommends a initial appropriation of $150,000, to be followed by two others about equal amounts. The question of maintenance is not a seri one in this case, as it appears that this item will not exceed ab $2,000 per annum, principally for work in Back Cove chann Comparing the cost of the further improvement now deemed nec sary with the large and increasing commerce of this port, leads board to the conclusion that it is not unreasonable, and therefore joins with the division engineer in recommending the project as o lined by the district officer and shown upon the map accompanyin

Inviting attention to the remarks of the district officer in t report of preliminary examination on the subject of wharves a terminals, the board reports that there are no questions of termin facilities, waterpower, or other subjects so related to the proje proposed that they may be coordinated therewith to lessen the c and compensate the Government for expenditures made in t interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 493.

ST. JOHNS RIVER, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF ST. JOHNS RIVER, FLA., FROM DEEP WATER AT OR BELOW COMMODORES POINT TO DEEP WATER ABOVE SIX-MILE CREEK WESTWARD OF THE MIDDLE GROUND BETWEEN ARLINGTON CUT AND THE WESTERN SHORE OF THE RIVER.

JANUARY 29, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 26, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 25th instant, together with copy of a report from Capt. G. R. Spalding, Corps of Engineers, dated July 15, 1911, of a preliminary examination of St. Johns River, Fla., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 25, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated July 15, 1911, by Capt. G. R. Spalding, Corps

Digitized by Google

of Engineers, on preliminary examination called for by the river a harbor act approved February 27, 1911, of—

Saint Johns River, Florida, from deep water at or below Commodores Point t water above Sixmile Creek westward of the middle ground between Arlingt and the western shore of the river, including a full consideration of the de and propriety of cooperation on the part of riparian owners.

The existing project for improvement of St. Johns River up Jacksonville provides for a 30-foot main ship channel. The m part of a section of this channel, about 8,500 feet long, known as Arlington Cut, lies within the reach in question, but the river is nearly 1 mile wide, and the cut lies generally nearer the ea shore with shoals between it and the western shore where a nu of important industrial plants are located at distances of 1,0 3,000 feet from the channel. At some of these plants owners dredged a branch channel and basins, and this examination is to determine the advisability of further dredging by the Govern alone or in cooperation with owners to connect these basins wit auxiliary channel, nearly parallel to and joining the main pr channel at the points named in the act. This additional chann one of the main propositions in plans for the betterment of har facilities at Jacksonville which are being worked out by local inter The district officer recommends a survey to develop a plan, estim of cost, and proportion of cooperation by the respective interests, the division engineer concurs in this recommendation.

As required by law, this report was referred to the Board of E neers for Rivers and Harbors, to whose accompanying report, da October 16, 1911, attention is invited. As the board was unab concur in the recommendation of the district officer and the div engineer for a survey and estimate of cost, a public hearing was by the board, at which further statements and arguments on the n sity of the work and the propriety of its being undertaken at expense of the General Government were submitted by the l interests. Having carefully considered the facts before it, the b concludes that, as the United States has undertaken at great cos provision of a suitable channel from Jacksonville to the ocean, the work now desired is in the nature of an auxiliary channel necessary for through navigation but more properly part of a deve ment of terminal facilities which should be provided by the loca the further improvement contemplated in this reach should no undertaken by the United States either alone or in cooperation w local interests, and therefore the authorization of a survey and es mate of cost is not recommended.

After due consideration of the above-mentioned reports, I co in general with the views of the Board of Engineers for Rivers a Harbors, and therefore, in carrying out the instructions of Cong I report that the improvement by the United States of St. J River, Fla., between Commodores Point and Sixmile Creek in manner apparently desired by the interests concerned as descri in the reports herewith, is not deemed advisable at the present ti

Very respectfully,

EDWARD BURR,
Acting Chief of Engineers

The SECRETARY OF WAR.

Digitized by Google

PRELIMINARY EXAMINATION OF ST. JOHNS RIVER, FLA.

UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., July 15, 1911.

SIR: In compliance with department letter dated April 7, 1911, I ıve the honor to submit the following report on the preliminary ıamination of—

Saint Johns River, Florida, from deep water at or below Commodores Point to deep ıter above Sixmile Creek, westward of the middle ground between Arlington Cut d the western shore of the river, including a full consideration of the desirability d propriety of cooperation on the part of riparian owners.

The St. Johns River is now being improved under a project author-ɜd by the act of June 25, 1910, which contemplates securing by ɜdging, rock excavation, and training walls a channel from the ean to Jacksonville having a depth of 30 feet at mean low water. ost of the work required to secure such a channel lies between Six-ile Creek and the ocean, a distance of 22 miles. From Sixmile ɜek to the Florida East Coast Railroad Bridge across the river at ıcksonville, a distance of 6 miles, the only work required for the main ıannel improvement is at the section known locally as Arlington Cut. ırough this cut the original limiting depth was about 21 feet. By ɜdging and scour this has been increased to 25 feet. This cut, hich is about 8,500 feet long between 30 feet bottom contours, con-ıcts two deep, wide basins, one extending from Commodores Point uthward to a point about three-fourths of a mile above the Florida ıst Coast Railroad Bridge, the other from a point about 8,500 feet ılow Commodores Point to Sixmile Creek. The former basin varies depth from 30 to 80 feet; the width between 30-foot contours being ɔm 600 to 1,000 feet, while the width of the river between shore lines ıries from 3,500 to 1,800 feet. The second basin varies in depth ɔm 30 feet to 40 feet; widths between 30-foot contours vary from ɔout 300 feet to over 1,000 feet, while corresponding river widths ıry from over 4,000 feet to 3,000 feet. Along the Arlington Cut sec-ɔn the river widens to a mile.

The above-described section of the river, with an additional mile ıtending from Sixmile Creek downstream to Trout Creek, forms ıe harbor of Jacksonville. In the harbor the range of tide varies ɔm 1.6 feet, at Trout Creek, to about 0.9 foot at Jacksonville. o unusual difficulties exist in through navigation. The Florida ıst Coast Railroad bridge, having a width of draw of 114½ feet, has, ɔ to this time, effectually limited the harbor on the south and ɔbably will continue to do so.

The section of the harbor from this bridge to Hogans Creek, a stance of 6,000 feet, the old section of the harbor, is at present ɪgely given up to wharves of coasting steamship lines, coal wharves, ıipyards, river boat line wharves, etc. An excepted section is that ırt east of the Florida East Coast Railroad bridge to McCoys Creek, hich is owned by the Atlantic Coast Line Railway, and at present ased, and next, eastwardly, the Seaboard upper dock, which was rmerly leased to the Clyde Line, but is now being altered to permit its use for handling incoming freights from foreign ports, such as rtilizer material, etc.

Just below Hogans Creek are the lumber docks of the Seaboard ir Line Railway and from there to Commodore Point, a distance of

Digitized by Google

nearly 5,000 feet, the river frontage is undeveloped, being held in large pieces by the Seaboard Air Line Railway and private individuals. Along the frontage from the Florida East Coast Railway to Hogans Creek the United States, under a project adopted March 2, 1907, is removing a rock ledge between the deep basin and the pierhead line to a depth of 24 feet. This work is rapidly nearing completion and will have cost, when completed, perhaps $100,000 less than the estimated cost, which, as raised in 1908, is $586,500.

Just below Hogans Creek deep water of the upper basin comes close to the pierhead line and 30 feet of water is available for a distance of about 1,500 feet. From there to Commodore Point the deep water swings away from the north bank, the 24-foot contour being nearly 1,000 feet from shore, the pierhead line following, roughly, the 18-foot contours.

Below Commodore Point conditions change very materially. The river widens out to nearly a mile in width; the deep-water channel, which is artificial (Arlington Cut), is located near the center of the stream and wide, shallow shoals extend from there to the shore line on either side.

This condition exists for a distance of about 8,500 feet when the lower deep-water basin is entered. For a distance of about 11,[illegible] feet this basin is easily approachable from the east side of the stream by docks, but for at least part of the length of the basin approach from the west side would require docks from 1,000 to 3,000 feet long. This is true also of the section along Arlington Cut.

These conditions have held back, to a large extent, the development of this section of the harbor. In spite of difficulties, however, the Atlantic Coast Line Railway Co. has here erected its large export docks; the Mason Forwarding Co. has erected commodious docks, and below these structures the Wilson & Toomer Fertilizer Co. and the Armour Fertilizer Co. have their factories. Below these to the plant of the Upchurch Lumber Co. and the Eppinger & Russel Creosoting Works, a distance of about 5,000 feet, the river front is practically undeveloped, held in fairly large tracts by private individuals, the United States Engineer Department owning a frontage of 2[illegible] feet, which it is proposed to use for storehouse, coal pile, and other purposes.

It is with this latter section that this report must deal, and the act appears to contemplate a channel practically parallel to the shore line and to the existing main channel and at a distance from the west shore which will permit of access to it by the riparian owners for purpose of carrying on commerce. There is no question but that such a channel, properly designed, would be of great benefit to the port and to general commerce and, of course, to the riparian owners. The Atlantic Coast Line Railway has spent a very considerable sum in excavating a channel about 1 mile long to the lower end of its terminal which does not appear to maintain itself. This is, perhaps, due to the fact that it is a dead end channel, that the ebb current runs across it diagonally, and the flood has no fair entrance to it. Both Wilson & Toomer and Armour have dredged basins at their docks which are holding well. There seems to be no way for them to secure an outlet from these basins to the main channel except by excavating a channel about 6,000 feet long to the main channel opposite the Upchurch Lumber Co.'s plant, and by connecting the upper end of this channel

Digitized by Google

with that of the Atlantic Coast Line. Such a large piece of work would benefit many other owners, among them the railroad, and none of the interests seem to feel that it should bear the cost of the whole work.

It would seem that work of such magnitude could best be done by the General Government, but it does not seem proper that it should all be done at Government expense.

The commerce last year along this section handled over the Atlantic Coast Line terminals alone amounted to 315,195 tons, consisting of general traffic imports, and exports, and coastwise movement of lumber, cotton, and naval stores, etc. The value of this commerce amounted to $9,455,850.

The commerce handled by Armour was 17,000 tons, having a value of $200,000; by the Mason forwarding tracks, 150,000 tons, valued at $900,000, principally in lumber and lumber products; by Wilson & Toomer Fertilizer Co., 34,000 tons, valued at $400,000. This is a total of 516,195 tons, valued at $10,955,850.

As stated above, the St. Johns River is now being improved to a depth of 30 feet, which will permit the safe navigation of vessels drawing 27 feet. Its commerce is large and varied. Its foreign business is rapidly increasing and will continue to increase, as the port now reaches far into the Middle West for tonnage for export and distribution of imports. Foreign commerce is, however, being done at very considerable disadvantage, owing to lack of sufficient water at important railroad docks. This condition is becoming increasingly bad as commerce continues to offer. The public of Jacksonville is very much aroused to the need of better facilities for this class of traffic. A very strong committee of the board of trade of the city has been at work for the past several months on the project, with the idea of securing a certain frontage upon which adequate docks open to the public at reasonable rates and without discrimination can be erected. It is proposed to so supervise these docks that all railroad as well as all water lines will have equal facilities in their use. In addition, effort is being made to have the railroad and manufacturing interests improve their facilities.

The committee has already accomplished a great deal. There is soon to be a joint meeting between steamship agents, a special committee of prominent citizens, and the presidents and traffic managers of the four railroad lines entering the city.

One of the most attractive and feasible propositions which have been advanced in the discussion of this important matter is the cutting of this proposed channel along the west shore. If carried through with a width of 300 feet with a good usable depth of 27 feet, I am inclined to believe there would be little maintenance work necessary, and especially so if, under proper permits and supervision, property owners would all bulkhead to the line of the proposed channel. If this were done, many of them would be able to increase the acreage of their high land holdings considerably and should, therefore, be willing to contribute much to the improvement. The manufacturing plants now located on the improved channel would save a large amount of money in lighterage each year and, in addition, the value of their holdings would increase, and they should be willing to contribute a fair amount of this saving and increment. Were the work undertaken by the Federal Government the railroads would benefit by being able to eliminate the cost of maintenance of their present

Digitized by Google

channel and would, likewise, benefit by the increment in value of their holdings, and should be willing to bear their part of the cost. Just what these amounts should be can only be determined after a careful estimate is made on the cost of the work, and a thorough investigation into land values and the cost of present handling of supplies to factories, etc.

It might, perhaps, be preferable, instead of requiring a cash payment from riparian owners, to require them to combine in the general interests of commerce in securing to the city in fee and free of all costs an adequate frontage on this channel, and to require of this city that on the property thus acquired ample docks and warehouses for the handling of imports and exports be erected, and to require further, that a terminal company under the supervision of the municipality shall at once extend its lines along the entire frontage and, by connecting with each pier or wharf and all the rail lines entering the city, furnish service to all on equal terms for the proper handling of freight between water and rail.

Should the latter idea prevail it must seem also fair to require owners to take steps at once toward the improvement of their holdings and that should they be unable to do this, then that they should be required to permit others to lease their property at reasonable rates and for a sufficiently long period to justify the necessary expenditure by the lessee.

A careful survey to properly plan such a project and to estimate its cost should be made before an intelligent discussion can be entered into. The information that would be available to riparian owners or the city from this survey, plan, and estimate would be in itself of sufficient value to commerce to justify the survey. It is my opinion that the project is certainly worthy of being prosecuted that far without any conditions being imposed and I therefore recommend that an allotment of $3,000 be made for the work of this survey.

There are no water power questions connected with the improvement. All questions of proper terminal facilities, land reclamation, etc., can best be entered into in the report on the survey.

Sheet 5 of the maps of the survey of St. Johns River, Fla., printed with House Document, No. 611, Sixty-first Congress, second session, covers the locality in question and the conditions can best be understood by reference to it.

Very respectfully,

GEO. R. SPALDING,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., July 19, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

This is a plan for greatly increasing the harbor facilities of Jacksonville, Fla. It will result in bringing deep water close to many wharves, and will have an enormous effect in increasing real estate values. The increase of real estate values is undoubtedly the prime motive that inspires the proposed work. I do not think that commerce is actually suffering very much at the present time.

Digitized by Google

The work, if accomplished, would no doubt be a very good thing, nd would tend to the upbuilding of the commerce of the port, and 'ould be of public advantage, but the advantage to the general pub-c is greatly outweighed by the local advantage. For this reason I m of the opinion that there would be no objection to the city's under-aking this work itself, but if the United States is to contribute, then ll the plans and conditions should be determined and laid down by he United States, in order that the result may lend itself in the high-st possible degree to the advancement of commerce, and that mo-iopolies may be prevented, and the public permitted to enjoy to the ullest extent the benefits of the improvement.

I think that in any case the local interests should bear by far the arger part of the expense, but in order to determine just what should be done I agree with the district officer that a sufficient survey should be made and a comprehensive plan prepared, and I recommend an allotment of $3,000 for this purpose.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 16, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The item of law calling for this investigation contemplates the improvement of the St. Johns River westward of the middle ground between Commodores Point and Sixmile Creek, and requires a full consideration of the desirability and propriety of cooperation on the part of riparian owners. This improvement would be auxiliary to the main improvement of the channel of the St. Johns River between Jacksonville and the sea, its principal object being the enlargement and betterment of the harbor facilities at Jacksonville. The question arises as to whether work of this character should be done by the United States, by the local interests concerned, or through cooperation by both. To determine the questions involved, the district officer and the division engineer recommend that a survey with suitable plan and estimate be authorized.

The General Government has expended on the St. Johns River between Jacksonville and the sea approximately $4,000,000 in creating a channel of suitable width and 24 feet in depth, and by the act of June 25, 1910, adopted an enlarged project which provides for a channel between the points named 30 feet in depth, 300 to 600 feet in width, at an estimated cost of $2,852,000. In addition to this nearly one-half million dollars has been expended within the limits of the harbor of Jacksonville in the removal of rock. When the present projects are completed, there will have been expended by the General Government in excess of $7,000,000, and ample channel facilities will have been afforded for the passage of the through commerce of this port.

The improvement now contemplated is a channel along the west shore (left bank) of the river between Commodores Point and Sixmile Creek. Over this reach the river is wide, and the main channel, which is followed in the recently adopted project, is near the middle of the stream and not accessible from the western shore except through some auxiliary work. The channel proposed is not neces-

Digitized by Google

sary for through commerce, and will probably not be used by vessels engaged in such, except those which will dock within the limits of the improvement.

The work is primarily in connection with the development of the harbor and terminal facilities, its principal object being to afford access to the wharves of about six large concerns which have established industries on this reach, the output of which amounts now to about 500,000 tons annually, out of a total of about 2,000,000 tons for the port. These industries were no doubt located after due consideration of physical conditions and the necessity of securing access to the sites. In the vicinity of the reach under consideration there are long stretches of unoccupied frontage which would be greatly enhanced in value by the improvement.

Finding itself unable to concur with the district officer and division engineer as to the advisability of making a survey and estimate of cost with a view to undertaking this improvement, the board requested that interested parties be invited to submit for its consideration statements and arguments bearing upon the necessity for the work and the propriety of its being undertaken at the expense of the general public. At the request of those interested, a hearing was given in the office of the board on October 9, 1911, at which appeared Hon. D. U. Fletcher and Hon. N. P. Bryan, U. S. S., and a delegation of local interests.

Much stress was laid upon the necessity of a complete and comprehensive development of terminal facilities at this locality to meet the expanding commerce of the port. It seems that the coordination of the many interests affected, and a determination of their respective benefits, and the amount of cooperation that should be furnished by each, is desired, and it was thought that this could best be done through the medium of a survey and investigation by the United States in connection with local interests.

After consideration of all the facts, it appears to the board that the questions involved in this case should be worked out primarily by local interests, and not by the United States. If it is found that the plan devised necessitates a change in existing harbor lines, the matter can then be taken up with the district officer. Should it involve dredging in United States waters, authority for which must be obtained, this can be done under existing law.

In view of the foregoing it is the opinion of the board that the improvement contemplated in this reach of the St. Johns River should not be undertaken by the United States alone or in cooperation with riparian owners. The board is therefore unable to concur in recommending the authorization of a survey.

Terminal facilities are described in the report on St. Johns River, made in compliance with the act of March 3, 1909, and published in House Document No. 611, Sixty-first Congress, second session, to which attention is invited.

There are no questions of waterpower, terminal facilities, or other subjects so related to the project proposed as to render the improvement advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 512.

ST. PETERSBURG HARBOR, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF EXAMINATION AND SURVEY OF ST. PETERSBURG HARBOR, FLA.

FEBRUARY 6, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 5, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copies of reports from Capt. G. R. Spalding and Capt. J. R. Slattery, Corps of Engineers, dated June 5, 1911, and November 21, 1911, with map, on preliminary examination and survey, respectively, of the harbor of St. Petersburg, Fla., made by them in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 3, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated June 5, 1911, by Capt. G. R. Spalding, Corps of Engineers, and November 21, 1911, with map, by Capt. J. R. Slattery, Corps of Engineers, on preliminary examination and survey, respec-

Digitized by Google

tively, of the harbor of St. Petersburg, Fla., called for by the river a[illegible] harbor act approved February 27, 1911.

This is an artificial harbor comprising a basin about 450 by 1,[illegible] feet, connected by a channel 120 feet wide with Tampa Bay, dredg[illegible] entirely at the expense of local interests, no work of improvem[illegible] having ever been done at this locality by the General Governm[illegible].

The district officer submits estimates of the cost of dredging t[illegible] basin and channel to depths of 10, 12, and 18 feet and protecting [illegible] channel of approach with a single jetty, but considers that noth[illegible] greater than a 10-foot depth is warranted, and then only on condi[illegible] of certain cooperation by local interests. From the letter of the [illegible]cials and others of the city of St. Petersburg, dated December 15, 19[illegible] herewith, it appears they are willing to cooperate to a certain exte[illegible] if required.

These reports have been referred, as required by law, to the Boa[illegible] of Engineers for Rivers and Harbors, to whose report dated Januar[illegible] 16, 1912, herewith, attention is invited. After careful considerat[illegible] of all the facts available, the board concludes—

that it is advisable for the United States to undertake the improvement of St. Pe[illegible]burg Harbor for the 10-foot project, provided that local interests bear a portion o[illegible] cost. The board considers it preferable that the division between the work to be d[illegible] by the United States and local interests should be placed at the shore line, the U[illegible] States providing and maintaining the entrance channel and jetty and the local in[illegible]ests providing and maintaining all work inside the shore line as defined by the ea[illegible] side of First Street on the accompanying survey map. It therefore recommend[illegible] the United States do the following work:

Dredging channel	$19,[illegible]
Jetty	7,[illegible]
Engineering and contingencies	4,3[illegible]
	32,0[illegible]

Maintenance $1,500 per annum, provided that before the improvement is begun [illegible]factory assurances will be given the Secretary of War that local interests will d[illegible] necessary work inside the shore end of the jetty, including the widening of the [illegible] 175 feet and rounding off the corner at the entrance, and the maintenance of the [illegible] to a depth of 10 feet at mean low water; and provided further, that the city fro[illegible] will be moved northward and the land along Salt Creek reserved for future enla[illegible]ments, all substantially as proposed in the letter of December 15, 1911, from the [illegible] of St. Petersburg and print accompanying the same, the exact lines to be determi[illegible] by the Chief of Engineers. The full amount of the above estimate should be ma[illegible] available in one appropriation.

After due consideration of the above-mentioned reports I conc[illegible] in general with the views of the Board of Engineers for Rivers a[illegible] Harbors, and therefore, in carrying out the instructions of Congre[illegible] I report as follows: That the improvement by the United States [illegible] the harbor at St. Petersburg, Fla., is deemed advisable so far as [illegible] secure an available depth of 10 feet and a width of 200 feet at [illegible] outer end, with a gradual widening at the inner end from the bay [illegible] First Street in the channel leading to this harbor, and its protection [illegible] the construction of a single jetty, following in general the meth[illegible] described in the report of the district officer, at an estimated cost [illegible] the United States of $32,000 for first construction, provided lo[illegible] interests cooperate in the improvement of the harbor to the full exte[illegible] recommended by the Board of Engineers for Rivers and Harbo[illegible] This estimate is based on the supposition that the construction wo[illegible] will, as now seems desirable and advantageous, be prosecuted und[illegible]

Digitized by Google

a first appropriation of the entire estimated cost, though not undertaken until after satisfactory assurance has been given that local interests will perform their part of this improvement.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF ST. PETERSBURG HARBOR, FLA.

UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., June 5, 1911.

SIR: In compliance with department letter dated April 7, 1911, I have the honor to submit the following report of a preliminary examination of harbor at St. Petersburg, Fla., as provided for in the river and harbor act approved February 27, 1911.

Previous improvements and reports.—This is a locality upon which no Government funds have been expended either for surveys or improvements. A report on a preliminary examination of the harbor was submitted December 7, 1905, by Maj. Francis R. Shunk, Corps of Engineers, and the report, which was unfavorable, may be found printed as House Document No. 148, Fifty-ninth Congress, first session.

Description of the locality.—The town of St. Petersburg is situated on the west shore of Tampa Bay at a point about 30 miles distant from the entrance to the bay, as measured along the present ship channel. It is 21 miles from the city of Tampa and but 8¾ miles from Port Tampa.

The 18-foot contour in Tampa Bay approximately parallels the shore line in front of the city at a distance of above 1 mile. The distance to the 12-foot contours is about half of a mile and to the 6-foot contours about three-eighths of a mile. The tidal currents in the bay along this frontage are generally about parallel to these contours and the shore line.

A channel with an available depth of about 12 feet leads south from St. Petersburg, joining deep water of the bay at a point about 6 miles south of the town. From the 18-foot contours the water in front of the city gradually deepens to 24 feet at a distance of about 1¼ miles from the shore, and this depth can be carried in a direction slightly north of east for a distance of about 3 miles, at which point the 26-foot channel leading from Port Tampa to the Gulf is entered. The fluctuation of the water surface is entirely due to the tides, the mean range of which at St. Petersburg is estimated to be about 2 feet.

St. Petersburg, according to the census of 1910, has a population of 4,200. By this, of course, is meant the permanent year-round population. The town, being delightfully situated, is a very popular winter home for northern people. It is estimated that during the height of the winter season the population is 15,000 and that during the winter months the average population is in excess of 8,000.

Present transportation facilities.—St. Petersburg is the largest town of Pinellas Peninsula, a point of land about 20 miles long and 12 miles wide. Old Tampa Bay, making up from Tampa Bay in a northwesterly direction for a distance of about 17 miles, separates this peninsula

Digitized by Google

on the north and east from the mainland, and thus denies to the peninsula a possible short-rail line to the deep-water ports on the bay.

On the building of the Orange Belt Railroad, which extended from Sanford, on the upper St. Johns River, across the State of Florida, and then south through the center of Pinellas Peninsula, St. Petersburg was made the southern terminus, and the railroad built a pier to the 16-foot contour to accommodate the water traffic required by the public along the line. Later this road was acquired by the Plant System, which was later absorbed by the Atlantic Coast Line System. It is understood that after the road came into the hands of the Plant System a fire destroyed the outer end of this pier, which, instead being rebuilt, was removed, and the dock now extends only to the 13-foot contour.

A number of citizens of St. Petersburg are of the opinion that in thus limiting the draft of vessels which could reach the pier, the railroad had an ulterior motive—to do away with the port rates at St. Petersburg and, also, to concentrate the railroad's water terminals in this vicinity at Port Tampa. Be that as it may, the pier is of small commercial advantage to the town, as practically no freight is received or forwarded over it. Practically, all freight moving in or out is handled over the branch line from Trilby, a point 76 miles north on the main line of the Atlantic Coast Line Railway.

In addition to the Atlantic Coast Line dock is one owned by the St. Petersburg & Gulf Traction Co.'s electric line, which extends to the 7-foot contour. The transportation companies owning these two docks have extended their tracks to the heads of the docks and freight and passenger depots are located thereon.

The Favorite line of steamers operates three passenger and freight steamers between Tampa and points on the Manatee River. These steamers stop at both docks, a daily service each way being given. A steamer line from Tampa to Sarasota makes a daily stop at either one or both wharves.

During the tourist season the Peninsular & Occidental steamer *Mascotte*, plying between Port Tampa and Habana, touches at the Atlantic Coast Line dock once a week. Wharfage is charged to vessels using either wharf and, except for the fact that regular boat lines have the right of way, the terminal facilities are extended to all on equal terms. There being no roadway for vehicular traffic, all freight must be transported in the cars of the respective wharf owners.

Commercial statistics.—The present commerce of St. Petersburg and adjacent territory is given in the following table, compiled from data obtained from the board of trade and other sources:

Vessels, class of.	Number.	Net registered tonnage.	Passengers carried.
Registered:			
Steamers	2,520	72,000	[illegible]
Sailing	10	3,000	.....
Unregistered: Launches carrying freight	312	4,300	.....

NOTE.—The arrival and departure of a vessel counted as one.

Digitized by Google

Freight traffic.

[From report of transportation committee, St. Petersburg Board of Trade.]

Articles.	Tonnage.	Value.
rick, building	29,000	$350,000
rick, paving	12,000	400,000
attle and horses	600	200,000
ement, lime, and plaster	20,000	200,000
itrus fruits (500,000 boxes)	20,000	875,000
oal and firewood	10,000	50,000
ry goods	2,000	700,000
ertilizers	6,000	210,000
lour and mill products	15,000	600,000
urniture	3,000	1,000,000
ish	1,000	200,000
rain and hay	20,000	600,000
roceries	10,000	600,000
ardware	4,000	2,000,000
umber, shingles, and laths	600,000	15,000,000
aval stores	5,000	600,000
ther than citrus fruits	1,500	40,000
Rock and stone	20,000	45,000
ponges	100	400,000
tationery and drugs	150	180,000
Vegetables	1,500	30,000
Wagons, carriages, and automobiles	100	110,000
Total	771,850	24,400,000

Above statistics cover the territory from St. Petersburg northward to Tarpon Springs and Trilby.

It will be noticed that 600,000 tons of this freight is made up of lumber, shingles, and laths. This tonnage at present moves to the Port Tampa terminals of the Atlantic Coast Line Railroad for shipment by coasting schooners to other parts of the United States or for export. I am inclined to believe that this item is too large. Whether it is or is not too large, inasmuch as it is tributary to the railroad it would probably continue to be hauled to Port Tampa. Of the remaining tonnage, St. Petersburg probably consumes and forwards 50,000 tons and the remainder is made up at various points along the line of the railway from St. Petersburg to Trilby.

Improvements desired.—A number of prominent business men believe that a proper improvement would be to dredge a channel from deep water in Tampa Bay, at a point about 12 miles from the entrance of the bay, northerly along the west shore of the bay, following, generally, the existing 12-foot channel and bring it close enough in so that it would be readily and economically reached by wharves. To secure such a channel would require dredging a distance between six and seven miles. While it is probable that such a channel could be constructed so that the tidal current would run with it, yet the beaching effect of waves in Tampa Bay would soon obliterate all of it which was dredged through shoal water unless it were protected by a substantial training wall.

Some others, few in number, believe that if the present docks were extended to deep water the difficulty would be solved, and especially so if a municipal dock were constructed to deep water. The objection to this method seems to be that these long docks are expensive to build and to maintain, on account of the ravages of teredos. Furthermore, landing at these exposed docks would only be possible in calm weather. In addition, unless the dock had an abnormally long head, only small vessels could moor there.

Digitized by Google

It was also suggested that twin breakwaters, similar to those used as harbors on the Great Lakes, be constructed in 20 feet of water, thus giving a protected harbor.

Aside from these views, attention was invited to the facts that there are now under way at St. Petersburg two harbor projects. One of these is being carried on by the municipality, the other by a private company, the Bayboro Investment Co.

The municipality owns the water frontage between the Atlantic Coast Line Railway dock and that of the Electric Traction Co. Along this frontage a sea wall and bay shore boulevard are being constructed and a basin is being dredged. This basin, if completed according to plans, will be 600 by 800 feet and will afford a secure harbor for a large number of small yachts, freight launches, and fishing boats. About 50 per cent of the project is completed. The minimum depth in the basin is 8 feet. Small launches carrying freight from Tampa unload in the vicinity of the sea wall. Some citizens believe that the United States should take over this work, complete it as planned, and maintain it.

The second project, that of the Bayboro Investment Co., contemplates a channel 340 feet wide and 15 feet deep from the 15-foot contour in the bay into Bookers Creek or Bookers Bayou (about a mile south of the Atlantic Coast Line dock; see Coast Chart 177), and to dredge out a basin in the bayou 1,360 feet by 450 feet. Work has progressed upon this until the basin is practically completed to a depth of 14 feet. A channel 120 feet wide and 13 feet deep was dredged, but as it is perpendicular to the line of tidal flow and exposed to wave action it has narrowed to 75 feet and shoaled to about 11 feet. Little commercial use has been made of this harbor except that launches and other small craft moor there in bad weather. About two months ago a schooner drawing 15 feet, loaded with cement, attempted to enter at high tide, but was unable to get in. The schooner was discharged at the Atlantic Coast Line wharf. It is believed that generally the citizens of St. Petersburg desire that the Government, by arrangement with the Bayboro Investment Co., take charge of the channel leading into the bayou and deepen it to 15 feet.

Arguments presented.—Mr. R. Veillard, chairman of the transportation committee of the board of trade, states that—

The natural advantages of the peninsula, with its mild, salubrious climate, are attracting large numbers of people from other less-favored sections. St. Petersburg has by the last official census shown a growth of 168 per cent in population. We had last winter 20,000 tourists, some staying as long as 8 months out of 12. This number is yearly increasing, according to the enlarged facilities we can afford to furnish in the way of new houses and hotels, which have been continually on the increase. We have 6,000 permanent residents.

Every need of this community—every enterprise—has been held back on account of lack of deep-water facilities, which lay almost at our door.

Coal is brought down from the eastern ports to Tampa for 90 cents per ton in schooners; we have to pay $3.40 by rail. The high price of coal is responsible for the lack of manufacturing enterprises, and gas works, and the ice factories, waterworks, and electric plants are at a great disadvantage.

The large horticultural and agricultural interests of this peninsula are paying an enormous tribute to the railroads for our lack of deep water.

There are thousands of yacht owners who desire to come to the harbors we are making who would gladly avail themselves of same if they were connected to the deep-water channel a short distance from our harbor.

The building of more houses, hotels, and factories would increase to a large extent if building material, such as lumber, brick, cement, lime, plaster, and hardware, could be delivered here by boat. Large shipments of valuable cypress lumber have lately been diverted from here to other points which have recently been given deeper channels.

Digitized by Google

The building of roads has been seriously retarded. Although St. Petersburg has ately built miles of streets with vitrified bricks and granite curbing we have to pay the railroad company more for freight from Augusta, Ga., than we have to pay for e material itself. With water transportation we could bring bricks here at a saving f $6 per thousand.

The people of our section are demanding good roads through the country. We have o practicable material here to build them, and an available lower rate would mean illions of dollars in substantial improvements.

The business men generally are impatient at the fact that their all-ail rate on incoming and outgoing freight is very high; that the ear-by town of Tampa, on account of its deep water, has a lower rail ate and splendid facilities for water shipment at low rates, while St. Petersburg must, if it desire supplies by steamer to Tampa and then arge to St. Petersburg, add the cost of barge haul to the Tampa rate. t was brought out in a statement of the secretary of the Bayboro nvestment Co. that recently the city of St. Petersburg had occasion o ship 100 tons of cast-iron pipe, and by shipping same by water to Tampa and then by barge to Bayboro Harbor saved $300, or $3 per on over the rail rate. He further stated that if the barge had been nloaded at the Atlantic Coast Line Wharf the charges on same rom the end of dock, including dock charges and switching to the Atlantic Coast Line depot, would have been $182.50.

I am informed that the Bayboro Investment Co. stand ready to give over to the United States any and all rights which they may have to the harbor, and, further, would agree to submit all wharfage charges to the Secretary of War for approval, and would provide that all wharves should be open to the public on equal terms.

Summary and conclusions.—The commerce of St. Petersburg is not much larger than would be expected in a town of from 4,000 to 8,000 population. It is not so situated as to be a distributing point for a very considerable territory. It has but one railroad reaching into its trade territory There is no question but that if a deep-water harbor were constructed that such articles as cement, coal, paving brick, etc., when needed in quantities by St. Petersburg or its tributary territory, could be brought in by water at a large saving. Indeed, as indicated above, a very considerable saving can be made by bringing such articles to Tampa by water and thence to St. Petersburg by barge. There is also no question, perhaps, but that with deep water a port rate would be established by the Atlantic Coast Line Railroad which would enable the merchants to receive their rail freight at a reduced figure. When all the statements and arguments are examined into it looks as if the question were one of terminal facilities open to the public at reasonable rates. The investment required to secure proper facilities is probably so great and the cost of maintenance so large that the income is not sufficient to justify the expenditure. The Bayboro Investment Co. has done a great deal of work and is deserving of credit. The expenditure necessary to complete their project and protect the channel, as will be necessary, by parallel dikes or jetties of some character will not be small.

Should the United States take over the work and complete it, all of the wharves would be in the control of that company, and while the company consists, in large part, of prominent gentlemen of St. Petersburg, the wharfage rates which they would be required to charge to insure an income on the investment might not be much less than those charged at present and might, at the same time, be considered reasonable by the War Department and approved. On the other hand,

Digitized by Google

the municipal project is more to secure a beautiful water-front park and a basin for pleasure boats, and there is considerable sentiment against its use as a purely commercial harbor. If it were possible for the municipality to secure a frontage of 600 feet on the Bayboro Harbor project and to agree to construct suitable municipal docks and warehouses thereon and to secure control over the wharfage and storage charges on all of the Bayboro Harbor frontage, I would recommend that a survey be made to determine the cost of the improvement and would believe that if that cost was not too great the locality would be worthy of improvement by the General Government. Awaiting such assurances, I am unwilling to recommend that the locality is worthy of improvement.

There are no questions of water power or other collateral subjects which appear to be pertinent to this report.

Very respectfully,

GEO. R. SPALDING,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., June 8, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I am of the opinion that this improvement is not worthy to be undertaken by the United States and I would not recommend that any survey be made of the locality.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 1, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

A comparison of present statistics covering population and commerce, with data on the same subject contained in former reports on preliminary examinations of this harbor, indicates some increase in both. While the tonnage of the vicinity and the section of the country commercially tributary thereto is not large, the enterprise shown by the community in the construction of local harbors for the accommodation of freight and pleasure craft points toward a probable increase of business in the future.

Believing that under conditions existing at the time of submitting his report the improvement would be of local rather than of general benefit the district officer reported the locality as unworthy of improvement, and in this view the division engineer concurred. The district officer stated, however, that—

If it were possible for the municipality to secure a frontage of 600 feet on the Bayboro Harbor project and to agree to construct suitable municipal docks and warehouses thereon, and to secure control over the wharfage and storage charges on all of the Bayboro Harbor frontage, I would recommend that a survey be made to determine the

Digitized by Google

st of improvement, and would believe that if that cost was not too great the locality uld be worthy of improvement by the General Government. Awaiting such assurces, I am unwilling to recommend that the locality is worthy of improvement.

At the request of interested parties, who were duly advised of the ews of the district officer, a hearing was given at the office of the ard on July 18, which was attended by Hon. D. U. Fletcher, United ates Senate, Hon. S. M. Sparkman, Member of Congress, and a deleation of citizens of St. Petersburg. It appears from statements ade and from papers filed with the board that the community has ecuted an agreement to deed to the municipality a wharfage area 0 feet in length by 125 feet deep, abutting on a public street in e rear and on the waters of the Bayboro Basin on the front, to be edicated to the public for wharfage purposes.

The question which now presents itself is the advisability of conecting this public wharfage area and the artificial basin with deep ater in the bay. While there does not seem to be much prospect r a commerce of great magnitude at this port, indications point to steady traffic of some importance, and the board believes that the uestion of advisability can be better determined after further investiation, including a survey. It is therefore recommended that a survey e authorized, and that estimates be prepared, for a channel of sufficient apacity to accommodate barges and such boats as now ply in the arbor and on the Manatee River, and also for a channel suitable for oastwise vessels. It is recommended further that the district officer iscuss the relative merits and suitability of these channels, and that e investigate and report upon what may be expected in the future s the way of local cooperation in the maintenance of the channel and asin.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, August 9, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of St. Petersburg arbor, Fla., authorized by the river and harbor act of February 27, 911.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a surey of the locality as proposed be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT,
August 10, 1911.

Approved as recommended by the Chief of Engineers.

JOHN C. SCOFIELD,
Assistant and Chief Clerk,
For the Secretary of War in his absence.

Digitized by Google

SURVEY OF ST. PETERSBURG HARBOR, FLA.

UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., November 21, 1911.

SIR: In compliance with department letter dated August 14, 191 I have the honor to report as follows on a survey of St. Petersbu Harbor, Fla.:

The survey, map of which accompanies this report, was com menced September 8, 1911, and was completed October 21, 191 It covers the portion of Tampa Bay in front of St. Petersburg fro a point 1,300 feet north of the city limits to a point 2,400 feet sou of Bayboro Harbor out to the 18-foot curve and a short distanc beyond, and likewise Bayboro Harbor. Currents were observed b means of rod floats and are as shown on the map. One hundred an seventy-six borings were taken in Bayboro Harbor and the chann leading thereto, which covered this basin and channel thoroughly and 75 additional borings were taken at other points in the are surveyed. The borings are not shown on the map submitted here with, as no rock was encountered at a less depth than 20 feet. Th distance from the shore line to the 18-foot curve, which is approxi mately parallel to the shore line, is about 1 mile.

In the true sense of the word there is no natural harbor at St Petersburg. Located on Tampa Bay as it is, it is not exposed, however, to any such wave action as it would be were it on the Gul coast. Tampa Bay, however, is a very considerable body of wate and becomes quite rough during stormy weather. There is no natura protection at St. Petersburg against the resulting wave action, whic during storms is sufficient to make it impossible for vessels to unlo at existing wharves.

The city of St. Petersburg is constructing a yacht harbor betwe the Atlantic Coast Line and Florida Electric Traction Co. pier Other extensive improvements in the way of beautifying the wate front are also contemplated in the future between the Atlantic Line pier and the northern end of Bayboro Harbor. The senti of the town is apparently strongly against making any use o yacht harbor or the water front between it and the northern en Bayboro Harbor for commercial purposes.

A very short distance south of the channel leading to Bayb Harbor the 18-foot curve bends to the eastward and then northw again and then east. This curve, in fact, forms the boundary o pocket of deep water leading to the deeper portions of the bay which the ship channels have been dredged. (See Coast Chart 17 Any improvement south of Bayboro Harbor would involve mo work because of the greater distance from this deep pocket. Th sentiment of the town also seems to be that any location south Bayboro Harbor would be too far from town. Both from interview with numerous leading citizens of St. Petersburg and from clipping from local papers, I am led to believe that the general desire is tha Bayboro Basin should be the harbor, and that the Federal Govern ment should dredge a channel leading thereto. I am further lead t believe that an improvement at any other point would be against th wishes of a very considerable number of citizens. No consideratio therefore, has been given to any other possible location or plan for harbor.

Digitized by Google

Digitized by Google

SUR

SIR: In compli
I have the hon
Harbor, Fla.:

The survey, I
menced Septe
It covers the po
a point 1,300 fe
of Bayboro Har
beyond, and lik
means of rod fo
seventy-six bo
leading theret
and 75 additio
surveyed. The
with, as no roc
distance from th
mately parallel

In the true
Petersburg. Lo
ever, to any su
coast. Tampa
and becomes qui
protection at St.
during storms is
at existing wh ar

The city of St
the Atlantic Co
Other extensive
front are also co
Line pier and th
of the town is
yacht harbor or
Bayboro Harbor

A very short
Harbor the 18-f
again and then
pocket of deep
which the ship
Any improvem
work because c
sentiment of th
Bayboro Harbo
with numerous
from local pape
Bayboro Basin
ment should dr
believe that an
wishes of a ver
therefore, has b
harbor.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Bayboro Basin is approximately 450 by 1,360 feet. The Bayboro vestment Co. is stated to have dredged this basin to a depth of feet, but as shown by the map such a depth is available only over extremely limited area. The said Bayboro Investment Co. also edged a channel 120 feet wide and 13 feet deep from this basin to e 13-foot curve in Tampa Bay. This channel leaves the basin at southeastern outlet in a direction at right angles to the longer is of the basin. This channel is bordered on the south by a con-lerable spoil bank. The channel width at the point where it leaves yboro Basin is 400 feet between property lines. A boat entering e basin, therefore, must make a change of direction of 90° a curve with a radius of not more than 400 feet. To provide an trance of less curvature it would be necessary either to shift the annel southward, or to widen the entrance. If the channel were ifted southward bends would have to be introduced to reach the ep pocket of water. Either procedure would involve securing le to private property. If the entrance were widened by cutting f a portion of the point separating Bayboro Basin from Tampa ay, it would encroach on the land on which the city of St. Peters-rg has an option to purchase for terminal purposes. The area of e basin proper is approximately 14 acres.

The current observations showed the currents to be almost parallel the shore line. The maximum observed velocity of currents dur-g flood tides was 0.37 mile per hour; the average velocity was 31 mile. The maximum observed velocity during ebb tides was 26 miles per hour and the average velocity was 0.5 mile per hour. would not be possible to dredge any channel leading from the ep pocket into Bayboro Harbor that the currents would follow. ny convenient channel leading from this pocket to the basin would almost at right angles to the tidal currents. The borings show e material forming the bottom of the bay in this vicinity to be a ne sand mixed with a small amount of shell and mud.

Shields states that fine sand will be moved by a current having a elocity of 0.4 mile per hour. Is is probable, therefore, that even there were never any storms in this bay that a channel dredged t right angles to the tidal currents would in the course of a few very ears be obliterated by the action of the tidal currents unless the annel were protected by jetties, and when the storms that occur this bay are considered, there would seem still less doubt as to e fate of an unprotected channel. The mean tidal range is only .84 feet, and therefore but little assistance in maintaining the hannel is to be looked for from the tidal flow in and out of Bayboro asin.

Mr. O. N. Bie, junior engineer, under whose immediate charge the urvey was made, states:

The gales on the Gulf coast of Florida are generally from southeast, southwest, and orthwest. Southeasters are the least severe and are of short duration; southwesters e strong and lasting, creating strong currents and rough water; the northwesters are ery violent, but of short duration.

As the general shore near St. Petersburg lies in a northeast and southwest line, e St. Petersburg roadstead is generally considered as a shelter during northwest ales. Unlike the east coast of Florida, northeast gales seldom occur.

The facts just cited and the additional fact that the channel dredged y the Bayboro Investment Co. has maintained itself fairly well where

Digitized by Google

protected by the spoil bank on the south, would seem to indicate a fair chance of a channel maintaining itself if protected by a jetty on its southern side. The sand spoil bank, however, has been prolonged just as far as it will stand, and a stone jetty must be used for an extension of the bank seaward.

In order to accommodate barge traffic a basin and channel with a depth of 10 feet at mean low water would be sufficient. The estimated cost of such a channel and basin, and of a jetty on the south side of it, is as follows:

Dredging basin, 62,100 cubic yards of sand, at 12 cents	$7,4[illegible]
Dredging channel, 164,804 cubic yards of sand, at 12 cents	19,7[illegible]
Jetty:	
2,174 cubic yards Florida rock, at $2.50	5,43[illegible]
486 cubic yards capping rock, at $5	2,43[illegible]
	35,0[illegible]
Engineering and contingencies, about 14 per cent	4,9[illegible]
	40,00[illegible]

Maintenance, $1,500 per year.

The jetty is assumed to be composed of Florida rock up to mean low water, and of granite rock suitable for capping from mean low water up to a plane 3 feet above mean low water, with side slopes 1 on 1, on the channel side, and 1 on 1½ on the south side, width of top 5 feet.

To accommodate coastwise vessels a depth of at least 18 feet would be necessary. The estimated cost of such a channel, basin and jetty is as follows:

Dredging basin, 218,812 cubic yards sand, at 11 cents	$24,06[illegible]
Dredging channel, 574,725 cubic yards sand, at 11 cents	63,2[illegible]
Jetty:	
46,307 cubic yards Florida rock, at $2.50	115,76[illegible]
3,986 cubic yards capping rock, at $5	19,9[illegible]
	222,9[illegible]
Engineering and contingencies, about 10 per cent	22,01[illegible]
	245,00[illegible]

Maintenance, $3,000 per year.

St. Petersburg is so situated that there is no chance of its ever becoming the distributing point for more than a small territory. Neither its local nor through commerce would at the present nor in the reasonably near future be sufficient to attract regular coastwise vessels. Occasionally, when large quantities of materials were needed, as for instance, bricks, when streets are to be paved, or water pipe for water supply, a coastwise vessel would be chartered to deliver the material, if an 18-foot harbor were available. I do not believe, however, that more than one ship per month would use an 18-foot harbor if it were provided, except possibly during the winter months, when there might be four or five ships per month doing passenger and package freight business. Bayboro basin, however, would be a very indifferent harbor for coastwise vessels, because of the difficulty of getting into it or out of it, and would be given a depth of 18 feet only at excessive cost, and then would be used to a most limited extent. I am, therefore, of the opinion that at the present time

Digitized by Google

harbor for coastwise vessels is not to be considered, even if Bayboro basin were dredged and maintained at the expense of the local community.

St. Petersburg and its tributary territory is at the mercy of a single line of railway, which in many cases charges rates apparently exorbitant. The charge made by this road for hauling over its pier certainly appears unreasonable. If it is so, all these rates could be regulated through the Interstate Commerce Commission. The construction of a municipal wharf carried out to a depth of water the same as that available at the end of the Atlantic Coast Line wharf would also serve to correct the rates at present charged by the Atlantic Coast Line Railroad for hauling over its wharf.

The city of Tampa has the advantage of rates on water transportation carried on in ships of considerable draft. The barge rates from Tampa to St. Petersburg would probably be very reasonable.

A barge line between Tampa and St. Petersburg would give the latter point rates only slightly above Tampa, if terminal facilities were provided for discharging the barges. Considering the small amount of business that would be handled at St. Petersburg, it is extremely doubtful if rates thus obtained could be bettered even if an 18-foot harbor were provided. Bayboro Basin dredged to a depth of 10 feet would make a very satisfactory barge harbor, although rather difficult to enter even for barges. A line of barges in addition to the steamboat line that now runs to St. Petersburg would, in my opinion, meet the needs of this locality in a very satisfactory manner, but it is rather doubtful whether there is enough business to warrant a local barge line between the two ports. A barge harbor would also enable the cargo of such occasional coastwise vessels as might arrive laden with cargo for the town to be readily discharged by means of lighters.

A harbor and channel having a depth of 12 feet would enable the Peninsular and Occidental steamers to use it. The cost of such a channel and harbor would be as follows:

Dredging basin, 94,481 cubic yards, at 11 cents	$10,392.91
Dredging channel, 242,308 cubic yards, at 11 cents	26,653.88
Jetty:	
14,079 cubic yards Florida rock, at $2.50	35,197.50
2,000 cubic yards capping rock, at $5	10,000.00
	82,244.29
Engineering and contingencies, about 10 per cent	7,755.71
	90,000.00

Maintenance, $1,500 per year.

I doubt if much material benefit would be derived from this additional 2 feet.

I am of the opinion that nothing more than a 10-foot barge harbor is warranted at this point, but that the locality is worthy of improvement to this extent, provided the city of St. Petersburg issues bonds for the purchase of the 600 feet of land covered by option and for the construction of suitable terminals, and provided further, that the city, under the supervision of the War Department, constructs the necessary jetty, no dredging to be undertaken by the United States until the city shall have completed a jetty on the south side of the channel.

Digitized by Google

As practically all the benefits that would accrue from any imp ment at this point would be almost entirely local and are mo less in the nature of terminal improvements rather than ha improvements, it would seem only proper that the city should a a portion of the expense involved.

If any greater improvement than a 10-foot harbor and entra desired the city should be required to pay the difference betwe cost and the cost involved in the 10-foot project herein recomme

In order to obtain reasonable prices the entire dredging work s be let in one contract, and therefore the entire sum which it is e mated the dredging work would cost should be appropriated in a sum, or else half should be appropriated in cash and a contract au ized for the entire amount.

Very respectfully,

J. R. SLATTERY,
Captain, Corps of Enginee

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Savannah, Ga., November 28, 191

Respectfully forwarded to the Chief of Engineers, United St Army.

St. Petersburg, Fla., is situated 9 miles, by water, from the ha of Port Tampa, a harbor upon which the United States has expe about $780,000, and it is situated a distance of about 20 mile water, from the harbor of Tampa, upon which the United St has expended $1,615,000 and contemplates a further expenditur over $1,000,000 more.

I do not advise that another harbor be commenced by the U States at St. Petersburg. It could never be more than a harbo the accommodation of strictly local business, and really abou that appears to be required is a wharf extending out into deep w

I can not say that I favor the plan of a single jetty suggested b district engineer. At present the dredged channel appears to n tain itself fairly well and this may possibly be due to the existe a tidal basin in the creeks back of it, which can produce a suff scour to keep it clear. I do not believe, however, that it can mai itself very long. The ebb-tide current, which is the strong parallel to the shore. Whenever there is sufficient wind to r waves, these waves will stir up the sand in the shallow water and c it to remain in suspension long enough to be moved for a ce distance in the direction in which the current is flowing. The cur will move along the shore until it comes to the jetty, then it will and flow outward around the end of the jetty. All along this c the sand raised in the shallow water will be dropping and buildin the bottom.

I think that two jetties will be necessary and, even then, a bar be formed, in time, at the outer end of them, due to this sand m ment. I have observed and measured this sand movement at har on the Great Lakes, and it takes place in water deeper than anyt in the vicinity of St. Petersburg and deeper than it would be at the of the proposed jetty.

Digitized by Google

At Fairport, Ohio, I measured the velocity of the shore current and took many samples of water at points along the shore and around the end of the jetties, which terminated in 20 feet of water, and found a sufficient sand movement and deposit to raise the bottom several inches in 24 hours as the result of a storm of very moderate violence.

If the improvement of this place is undertaken, I would advise two jetties and would make provision for annual maintenance. This, of course, would greatly increase the cost. I think, however, that the needs of the place could be better met by a well-constructed wharf, with suitable spring fenders, against which a staunch and seaworthy barge or vessel could lie in any kind of waves likely to occur in such shallow water.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 16, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

A survey of St. Petersburg Harbor having been made, the district officer presents estimates for improvement by dredging the artificial basin and the channel of approach and protecting the latter with a jetty, as follows:

Channel and basin 10 feet deep at mean low water:	
Dredging basin	$7,452.00
Dredging channel	19,776.48
Jetty	7,865.00
Engineering and contingencies	4,906.52
	40,000.00
Maintenance, $1,500.	
Channel and basin 12 feet deep at mean low water:	
Dredging basin	10,392.91
Dredging channel	26,653.88
Jetty	45,197.50
Engineering and contingencies	7,755.71
	90,000.00
Maintenance, $1,500.	
Channel and basin 18 feet deep at mean low water:	
Dredging basin	24,069.32
Dredging channel	63,219.75
Jetty	135,697.50
Engineering and contingencies	22,013.43
	245,000.00
Maintenance, $3,000.	

It will be seen from an examination of the map of the locality that, as stated by the district officer, any channel leading from deep water in Tampa Bay to St. Petersburg must practically be at right angles to the general shore line and the tidal currents, and in the course of a very few years would be obliterated unless the channel were protected by one or possibly two jetties. His investigations lead him

Digitized by Google

to believe that one jetty may serve the purpose, and this he propo- to place on the south side of the entrance. He believes that S Petersburg is so situated that there is no chance of its ever becom:. a distributing point for more than a small territory; that neither . local nor through commerce would be sufficient to attract regu. coastwise vessels, and that it would be used by such to a very limit extent. He therefore considers the harbor of little value from t: standpoint of coastwise traffic.

He is of the opinion that nothing more than a 10-foot dep which will accommodate light-draft steamers and barge traffic betw Tampa and St. Petersburg and other points on Tampa Bay and Man tee River, is warranted at this point, but that the locality is wort of improvement to this extent on condition that the city of St. Peter- burg acquire a strip of land 600 feet long bordering the basin, now c ered by an option, provide for the construction of suitable pul terminal facilities thereon, and construct the necessary jetty unc the supervision of the War Department. The division engin invites attention to the large expenditures already made at Tampa a Port Tampa, both near by, and does not advise that another harbor : commenced by the United States at St. Petersburg. He does n favor a single jetty, and recommends that, if the improvement undertaken, provision be made for the construction and maintenan of two jetties, which would materially increase the cost of the i provement.

The district officer refers to the smallness of the basin and the di culty of entering on account of the sharp turn at the junction of t channel and the basin. With reference to these features, it appe from a communication transmitted herewith, dated December 1 1911, signed by the mayor, the president of the city council, t president of the board of trade, and the president of the Baybo Investment Co., that local interests have taken steps to overcor these objections, and that the city of St. Petersburg and the Baybo Investment Co. are prepared to enlarge the basin if required b increasing its width about 175 feet, and by reserving for the futu needs of the harbor such space as may be required extending sout westerly along Salt Creek. These two items, it is stated, would see to provide satisfactorily for all future requirements and interest parties state they are prepared to guarantee them. It is also pr posed to move the 600-foot strip to be reserved for terminal purpo 300 feet farther to the north, which will permit of ample roundi of the corner at the entrance of the channel into the basin, so as permit vessels to make the turn with greater ease. Local inter also agree to construct the jetty required for the 10-foot proje recommended by the district officer.

Those concerned desire a greater depth, but state that the 10-f project would be of great value, as it would accommodate all lo traffic, which as yet is the bulk of the trade, and would enable the to make use of deeper-draft vessels by lightering their cargoes in the basin.

On January 8, 1912, Hon. S. M. Sparkman and Hon. James S Simmons, Members of Congress, appeared before the board and pr sented arguments in favor of the improvement.

After mature consideration of all the facts available the board h reached the conclusion that it is advisable for the United States w

Digitized by Google

undertake the improvement of St. Petersburg Harbor for the 10-foot project, provided that local interests bear a portion of the cost. The board considers it preferable that the division between the work to be done by the United States and local interests should be placed at the shore line, the United States providing and maintaining the entrance channel and jetty and the local interests providing and maintaining all work inside the shore line as defined by the eastern side of First Street on the accompanying survey map. It therefore recommends that the United States do the following work:

Dredging channel	$19,776.48
Jetty	7,865.00
Engineering and contingencies	4,358.52
	32,000.00

Maintenance, $1,500 per annum, provided that before the improvement is begun satisfactory assurances will be given the Secretary of War that local interests will do all necessary work inside the shore end of the jetty, including the widening of the basin 175 feet and rounding off the corner at the entrance and the maintenance of the basin to a depth of 10 feet at mean low water; and provided further, that the city frontage will be moved northward and the land along Salt Creek reserved for future enlargements, all substantially as proposed in the letter of December 15, 1911, from the city of St. Petersburg, and print[1] accompanying the same, the exact lines to be determined by the Chief of Engineers. The full amount of the above estimate should be made available in one appropriation.

In compliance with law, the board reports that there are no questions of water power involved at this locality, and, except as proposed above, there are no questions of terminal facilities or other related subjects which could be advantageously coordinated with the recommended improvement in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF THE CITY OF ST. PETERSBURG, FLA.

DECEMBER 15, 1911.

GENTLEMEN: To the courtesy of Mr. Webber, of your office, to Mr. W. L. Straub, of this city, we are indebted for full information of the reports and conclusions of the Government engineers of the Jacksonville and Savannah offices upon the survey recently made of St. Petersburg's water-front improvements and plans, together with further information of conditions relating to the work already done by our own local interests that seem regarded by the engineers as obstacles to an effective project, upon all of which reports and conditions we respectfully beg to say:

(1) The inadequate size of our basin with regard to future expansion. It is within the power of the city of St. Petersburg and the Bayboro Investment Co. at this time to make provisions guaranteeing what seems to us ample room for any expansion the future could reasonably be expected to require. At this time, before the public wharves are constructed, the east line of the basin can be placed about 175 feet farther east, to the west line of block 23, as indicated by the red line on the accompanying map, widening the present basin from a width of 450 feet to a width of about 625 feet.

Further, it is also possible to reserve for future needs such space as your engineers would advise extending southwesterly along Salt Creek.

[1] Not printed.

Digitized by Google

This, it seems to us, would satisfactorily provide for all future requirements, a this we are prepared to guarantee to do.

(2) The right-angle turn at the entrance to the basin. We confirm the assur given Mr. Webber by Mr. Straub that the 600 feet of frontage on which the city o Petersburg holds an option of purchase pending the proposed developments ma transferred to the northward, leaving 300 feet to be cut off the angle, as indicated the dotted red line.

(3) The construction of the jetty for the 10-foot project recommended by the neer's report, the estimated cost of which would be about $7,800, we hereby guara shall be done.

In conclusion we desire to confess our keen disappointment that the engineer ma this report could not see his way to recommend such a project as we had asked and which we have believed all the conditions at our city warrant and our n require. We will not go further into this phase of the subject here, as practic all available statistics and information relating to it have been hitherto filed in y office. It appears that we have much work still to do to prove our faith in the of St. Petersburg, its present and its future, and we are prepared to do it.

A 10-foot project would be a very great and valuable help, indeed. It would acc modate all local traffic, which as yet is the bulk of our trade; and it would enable to bring deeper-draft vessels here by lightering their cargoes in from their anchora not far out, which would afford a great relief from the cost burden our people n bear in getting certain classes of freight here.

We most earnestly appeal to your honorable body for the approval of the 10-f project recommended for St. Petersburg by the engineer, and again pledge to t Government every possible aid and cooperation in the work, and to provide su changes and enlargements of the plans as referred to above if your engineers shall direct or require.

Very respectfully submitted.

A. T. Blocker,
Mayor

G. W. Blodgett,
President City Council

S. D. Harris,
President Board of Trade

H. A. Murphy,
President Bayboro Investment Co.

The Board of Engineers for Rivers and Harbors.

O

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 513.

ARCHERS CREEK, S. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION, WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF ARCHERS CREEK, S. C.

FEBRUARY 6, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 5, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copies of reports from Capt. E. M. Adams, Corps of Engineers, dated September 6, 1910, and January 28, 1911, with map, on preliminary examination and plan and estimate of cost of improvement of Archers Creek, S. C.; also of a supplemental report thereon from Maj. G. P. Howell, Corps of Engineers, dated January 5, 1912, all made in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 3, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated September 6, 1910, and January 28, 1911,

Digitized by Google

with map, by Capt. E. M. Adams, Corps of Engineers, on preliminary examination with plan and estimate of cost of improvement of Archers Creek, S. C., together with a supplemantal report thereon dated January 5, 1912, by Maj. G. P. Howell, Corps of Engineers, all prepared under authority of the river and harbor act approved June 25, 1910.

Archers Creek, a narrow tidal passage about 3 miles long, lying between Port Royal Island and Paris Island, S. C., and connecting Beaufort and Broad Rivers, has not been previously examined or reported upon.

Sufficient depth already exists through the greater part of the creek, the obstructions being the bars at each entrance and the shoal in the middle at the tidal dividing. The opening of the creek is desired to afford a more protected route for the type of vessels using the present inland passage between Charleston, Beaufort, and Savannah, as the Port Royal crossing, by reason of its configuration, nearness to the ocean, and exposure to gales, is hazardous and frequently impracticable for such craft.

The district officer proposed the excavation of a channel through the obstructions 7 feet deep at mean low water and 100 feet wide on the bottom, at an estimated cost of $50,000. The Board of Engineers for Rivers and Harbors, to whom these reports were referred, as required by law, considered this cost high as compared with the probable commerce, and upon its request the district officer prepared an estimate for a channel 6 feet deep and 75 feet wide on the bottom. In the opinion of the district officer, this depth would reasonably serve the needs of traffic, and this lesser improvement at an estimated cost of $25,000 is recommended by the board, provided a right of way 1,000 feet wide is furnished free of cost to the United States, as recommended by the district officer. It is believed that this channel once opened will hold fairly well for many years, and therefore the district officer submits no estimate for maintenance.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officers, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Archers Creek, S. C., is deemed advisable so far as to secure an available channel depth of 6 feet at mean low water and a channel width of 75 feet, following in general the methods described in the report of the district officer, and subject to the condition recommended by him that a right of way 1,000 feet wide be ceded free of cost to the United States before this improvement is undertaken, at an estimated cost of $25,000 for first construction. This estimate is based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a single appropriation of the entire estimated cost.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

Digitized by Google

PRELIMINARY EXAMINATION OF ARCHERS CREEK, S. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Charleston, S. C., September 6, 1910.

SIR: I have the honor to report upon preliminary examination of Archers Creek, as required by the river and harbor act approved June 25, 1910:

Archers Creek has not been previously examined or reported upon.

On August 10, 1910, by circular letter, I invited presentation of the views of all parties known to be interested. On September 3, 1910, I visited the locality, inspected the creek, and conferred with representatives of the communities and commercial bodies concerned.

Archers Creek is a narrow tidal passage lying between Port Royal Island and Paris Island, S. C., and connecting Beaufort River with Broad River. It is well shown on United States Coast and Geodetic Survey Chart 155.

On the chart is also shown, by broken line, the route of the present inland passage between Charleston, Beaufort, and Savannah. This route serves general navigation between the three points named, and also local traffic between Beaufort and points west of the Broad River. It will be noted that the present route passes, necessarily, well down toward the entrance to Port Royal Sound, which is broad and exposed; from which fact arises the local desire for improvement of Archers Creek.

As stated, vessels using the inland passage must effect a crossing low down in Port Royal Sound. By reason of its broad and open configuration, its nearness to the ocean, and exposure to gales the Port Royal crossing is almost always hazardous and frequently impracticable for craft such as utilize the inland route. The interested parties urge that Archers Creek be opened to navigation in order that, by passing through that creek and the Rose Islands Passage, vessels may avoid the dangers of the crossing below Paris Island and Daws Island spits.

Inspection and survey previously made show that through the greater part of the creek the depths and widths are sufficient, but that there is a bar at each entrance and a shoal in the middle at the tidal dividing which prove obstructive. The least depth at the eastern entrance is 3 feet; at the western entrance, 6.3 feet; and at the dividing, 1.6 feet.

PRESENT COMMERCE.

A regular line of steamers, carrying mail, passengers, and freight, operates between Savannah and Beaufort.

Oyster-canning factories are in operation at Port Royal and Beaufort; oysters are drawn from all of the waterways west of Broad River. Engaged in this transportation are schooners and sloops of 6 to 8 feet draft.

Cotton and truck, raised on the plantations of the Broad, Colleton, Chechessee, Pocotaligo, and Oketeet Rivers, are carried by schooners, sloops, and power boats to Port Royal for shipment by rail and to Beaufort for local consumption and for shipment.

Digitized by Google

Fertilizers are sent by vessel from Port Royal to the plantations. Groceries and country supplies are sent by vessel from Beaufort to Bluffton and to the plantations.

According to best information available, the amounts per annum are:

	Tons
Oysters	3,300
Truck	1,300
Fertilizers	300
Cotton	50
Groceries and supplies	600
	5,450

Some of this traffic now uses Archers Creek, but must await high water.

PROSPECTIVE COMMERCE.

Were Archers Creek improved to admit of utilization at any stage of tide, the above traffic would probably be largely increased, possibly quadrupled. In addition a large lumber company is organizing a plant to be erected at Port Royal, which will draw its timber from Broad River and adjacent valleys, rafting to Port Royal. This latter traffic will particularly be benefited, as the loss by reason of breaking up of rafts in the open sound will be obviated.

I believe that the request for improvement of Archers Creek is reasonable, and that the improvement, if effected, will be utilized. While the work requested is of no very great importance nor particularly urgent, it may be said that it will be quite inexpensive, and this appears to be one of those cases in which a small expenditure upon the part of the United States is justified by the existing traffic and is likely to result in substantial benefit and increase. In addition Archers Creek and the Rose Island Passage form a part of the projected intracoastal waterways, so that work now undertaken in Archers Creek will be in line with the future development.

No questions of flood control, water power, or terminals are involved.

Archers Creek is worthy of improvement by the United States. No survey is required, as in the course of the intracoastal waterways survey an accurate map of the creek has been prepared.

I recommend that preparation of a project and estimate of cost be authorized.

Very respectfully,

E. M. ADAMS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER,
SOUTHEAST DIVISION,
Savannah, Ga., September 8, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, with the statement that, in my opinion, the improvement of Archers Creek is worthy of being undertaken by the General Government.

I would recommend that the district officer be authorized to prepare a project of improvement and an estimate of cost of the same.

Digitized by Google

This line will constitute a part of the inside water route from Beaufort to Key West, which will be recommended by the Board of Engineers now considering the matter. If Congress undertakes the development of the entire route, then this particular section will not require a separate project or separate and independent consideration, but it is worthy of improvement whether the inside route from Beaufort to Key West is undertaken by Congress or not.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 26, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

The route of the present inland waterway between Charleston, Beaufort, and Savannah passes around the lower end of Paris Island, well down toward the entrance to Port Royal Sound, where navigation is hazardous for small craft. It is stated within that the improvement of Archers Creek is desired by local interests in order to provide a protected channel from Beaufort River to Broad River and Rose Islands Passage, thus avoiding the dangers of the existing route.

It appears that this creek is a link in the proposed intracoastal waterway from Beaufort, N. C., to Key West, Fla., of which a survey has recently been made. In case this waterway is constructed, a separate project will not be required for Archers Creek, but as the improvement of this creek will afford advantages in connection with the navigation of existing routes of commerce, the board concurs with the district officer and the division engineer in recommending that a plan and estimate be authorized for independent consideration, a knowledge of the cost of the work being deemed essential to the determination of its advisability. Data for the preparation of a plan of improvement being available, no allotment of funds for this purpose will be required.

As the usefulness of the proposed improvement appears to depend largely upon its relation to Rose Islands Passage, it is recommended that the district officer report whether the latter locality in its present condition will afford satisfactory channel in connection with the one proposed through Archers Creek. It is also considered desirable to have such data concerning terminal facilities as those called for by department circular letter of November 23, 1909.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 6, 1910.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Archers Creek, S. C., authorized by the river and harbor act of June 25, 1910.

Digitized by Google

Inviting attention to the report of the Board of Engineers f Rivers and Harbors in the preceding indorsement, I recommend th preparation of a plan and estimate of cost of improvement of t locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *October 7, 1910.*

Approved.

ROBERT SHAW OLIVER,
Acting Secretary of War.

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF ARCHER CREEK, S. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Charleston, S. C., January 28, 1911.

SIR: Supplementing preliminary examination of Archers Creek S. C., as ordered by the act approved June 25, 1910, I have the hon to report upon survey authorized by the Secretary of War Octob 7, 1910:

A tracing[1] is submitted herewith showing the whole length Archers Creek from Battery Creek, Beaufort River, to Broad Riv A small scale index map is included for the purpose of making c the relation to adjacent waterways.

To provide the improvement required to accommodate the tran discussed in the preliminary report, I recommend excavation of a channel 7 feet deep at mean low water, 100 feet bottom width, f lowing the center line shown on the tracing. It will be obse that dredging is required in the eastern half only, though it n be well at the same time to remove the small lump in the western entrance.

The excavation amounts to:

	Cubic
For the net prism	19
Allowing 1 foot over depth	3
Total	228

The material is soft mud, sand, and shell, easily movable by hydraulic dredging. But, on account of the small total yarda the unit price will probably exceed that obtainable on larger work I estimate:

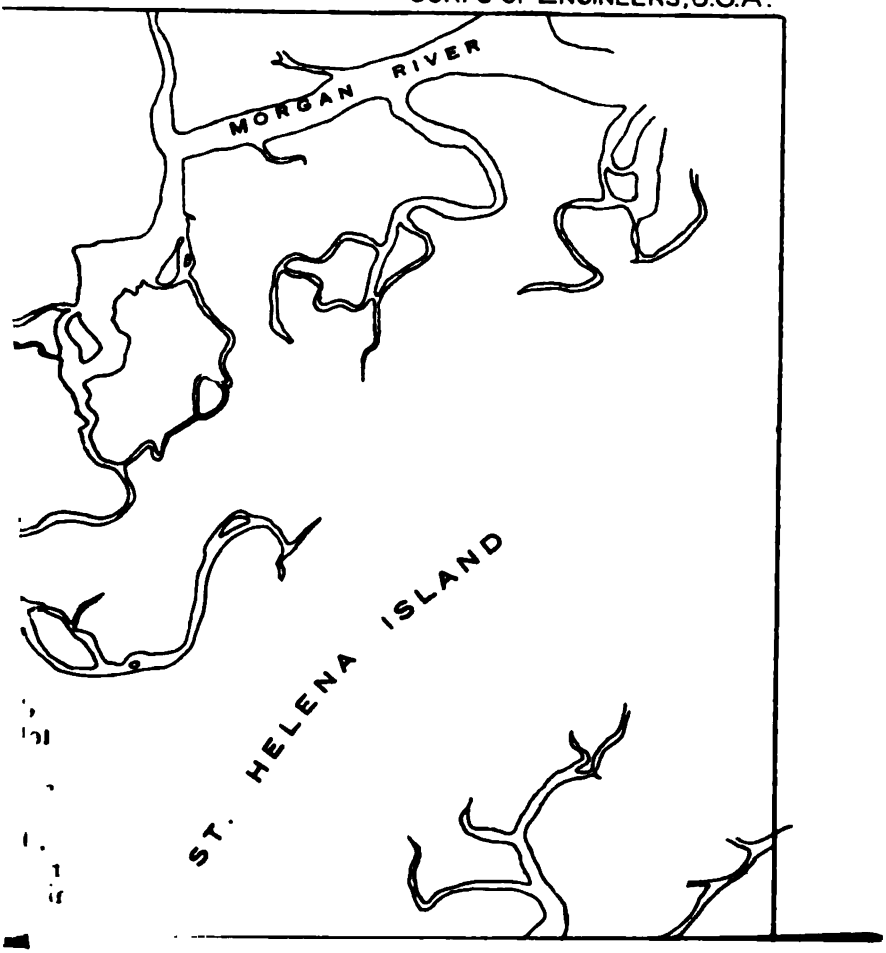
228,421 yards, at 20 cents	$45,684.3
Superintendence and surveys	4,315.8
Total	50,000 0

It is inadvisable to submit any estimate for maintenance, as th cut, once well opened, should hold fairly well for many years, and should not become an annual or biennial charge. Ultimate maintenance cost is indeterminate, but should be small.

---

[1] Not printed.

Digitized by Google



Digitized by Google

Digitized by Google

The usefulness of this improvement is enhanced by its relation to he Rose Islands passage, which, while susceptible of improvement, ffords in its present condition a channel such that any craft which an utilize the proposed Archers Creek Channel can also use the Rose slands passage, thus avoiding exposure in the open sound. To make his point clear, a map on smaller scale, taken from the intracoastal urvey, is placed upon the upper left-hand corner of the tracing.

In response to the inquiry of the Board of Engineers for Rivers and Harbors:

(*a*) There are no terminals on Archers Creek. There need be none, as this improvement is to be of the nature of a connecting waterway, by which vessels may pass between Broad and Beaufort Rivers, but within which there is no occasion for stopping, loading, or discharging.

(*b*) At Beaufort there are no wharves owned by the public, and, as far as I can learn, no publicly owned space for wharves. But there are several wharves, semipublic in character, the use of which is extended to all upon equal terms; and there is ample space, now unoccupied, available for the construction of wharves, public or otherwise, as may be needed. The Charleston & Western Carolina Railway, which serves Beaufort, does not extend to the water front within the town limits, but has its own water terminals at Port Royal. The wharves of Beaufort are provided with no particular appliances, the character of the trade not yet being such as to justify expensive installations.

(*c*) At the other end of this commercial route lies the region of the Broad, Colleton, Chechessee, Pocotaligo, and Oketeet Valleys, where there are numerous small landings which adequately serve the traffic.

(*d*) Discussion of the Savannah terminals does not seem pertinent to the question here at issue.

(*e*) I consider this a case in which no action upon terminals need be taken by the United States.

In the event of adoption of this project, the entire amount, $50,000, should be provided in a single appropriation; the work should be completed within one year.

No provision for cost of right of way is included, as the route lies through marine marsh of no value, title to which is understood to rest in the State of South Carolina. But in order that there may be no untoward complication, I recommend that the appropriation be made explicitly contingent upon cession to the United States, free of charge, of right of way 1,000 feet wide.

Very respectfully,

E. M. ADAMS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER,
SOUTHEAST DIVISION,
Savannah, Ga., January 30, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I am of the opinion that Archers Creek is worthy of improvement, as a part of the inside water route from Savannah, to Charleston, and as a part of the intracoastal route from Beaufort to Key West.

Digitized by Google

I think that, when improved, it should be given the standard dimensions which the board will recommend for the entire route south of Beaufort, and the dimensions will probably exceed those given by the district officer in his recommendation.

If the inside route project is accepted by Congress and its execution undertaken, then no separate project or estimate will be required for Archers Creek, but if the larger project is rejected, then Archers Creek in my opinion, is worthy of improvement to the extent herein proposed.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 15, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The district officer presents herein a plan for the improvement of Archers Creek, S. C., which provides for a channel 7 feet deep at mean low water and 100 feet bottom width, at an estimated cost of $50,000. He states that there should be no annual or biennial charge for maintenance as it is believed that the channel once opened will hold fairly well for many years, and therefore no estimate is submitted. He recommends the improvement as advisable, provided the necessary right of way is furnished free of cost to the United States and in this view the division engineer concurs.

In its study of this improvement it appeared to the board that the cost was high as compared with the probable amount of commerce that would use this waterway, and request was made for an estimate of a channel 6 feet deep and 75 feet wide, and an expression of opinion as to whether a channel of this size would not reasonably serve the needs of traffic. In a supplemental report the district officer presents an estimate for a channel of these dimensions in the sum of $25,000. He states that there are two other localities on the route which would be followed by the principal commerce using Archers Creek where the depth is now less than 6 feet, and that a 6-foot depth through Archers Creek should reasonably serve the needs of traffic.

The board believes that the sheltered route which would be provided by the proposed improvement would be of sufficient benefit to general commerce and navigation to warrant the expenditure required for the lesser project, and therefore it reports that in its opinion it is advisable for the General Government to provide a channel 6 feet deep and 75 feet bottom width, at an estimated cost of $25,000, provided a right of way 1,000 feet wide is furnished free of charge to the United States, as recommended by the district officer. The full amount of the estimate should be made available on one appropriation.

In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be so coordinated with the improvement proposed as to lessen the cost to the United States in the interests of navigation.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

Digitized by Google

SUPPLEMENTAL ESTIMATE OF IMPROVEMENTS OF ARCHERS CREEK, S. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Charleston, S. C., January 5, 1912.

SIR: As directed by the Chief of Engineers December 23, 1911, in ndorsement transmitting a request of the Board of Engineers for Rivers and Harbors for an estimate of the cost of the channel through Archers Creek, S. C., 6 feet deep and 75 feet bottom width, I have the honor to submit the following supplemental report:

To form a channel 75 feet wide and 6 feet deep at mean low water will cost by dredging as follows:

6-foot depth, 100,000 cubic yards, at 20 cents	$20,000
1-foot overdepth, 15,000 cubic yards, at 10 cents	1,500
Superintendence, contingencies, etc	3,500
Total	25.000

The main value of this improvement is that it will form a sheltered channel for the inland passage between Beaufort, S. C., and Savannah, Ga., by avoiding the present exposed route across Port Royal Sound. There are two other localities on this route where the depth is now less than 6 feet—Ramshorn Creek and Mud River. Interested parties at the time the preliminary examination was made expressed a desire for a 6-foot channel. The channel will be used by motor boats and by a line of steamers between Beaufort and Savannah. A 6-foot depth will satisfy the former, and with a tidal rise of 8 feet it should satisfy the latter. In my opinion a channel of this size will reasonably serve the needs of traffic.

Very respectfully,

G. P. HOWELL,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

O

Digitized by Google

Digitized by Google

2D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 519.

YAQUINA RIVER, OREG., FROM TOLEDO TO YAQUINA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION AND SURVEY OF YAQUINA RIVER, OREG., FROM TOLEDO TO YAQUINA, WITH REPORT UPON ANY PROPOSITION FOR COOPERATION BY LOCAL INTERESTS.

FEBRUARY 7, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, February 6, 1912.

SIR: I have the honor to transmit herewith, a letter from the Chief of Engineers, United States Army, dated 5th instant, together with copies of reports from Maj. J. J. Morrow, Corps of Engineers, dated August 17, and December 27, 1911, with maps, on preliminary examination and survey, respectively, of Yaquina River, Oreg., from Toledo to Yaquina, including a report upon a proposition for cooperation by local interests, made in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 5, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated August 17, and December 27, 1911, with maps, by Maj. J. J. Morrow, Corps of Engineers, on preliminary examination and survey, respectively, of Yaquina River, Oreg., from

Digitized by Google

Toledo to Yaquina, including a report upon a proposition for cooperation by local interests, prepared in pursuance of a call in the river and harbor act of February 27, 1911.

Yaquina River has previously been the subject of preliminary examination at the call of Congress, but has never been improved by the United States. The improvement desired is a channel in the river and in Depot Slough of similar depth to that across the bar at the bay entrance (12 feet at mean lower low water) so that vessels able to cross the bar may pass unobstructed up to Toledo, 9 miles above Yaquina, where the principal sawmills are located.

Sufficient depth already exists to above Oysterville, 2½ miles above Yaquina, and the district officer has prepared a plan for securing, mainly by dredging, a channel thence to a point just below the Fir and Spruce Lumber Co.'s dock at Toledo, 10 feet deep at mean lower low water, 200 feet wide on bottom in Depot Slough, and 150 feet wide in straight reaches and 200 feet on curves in the river, at an estimated first cost of $72,000. Maintenance work is estimated to cost $3,000 every two years if the dredge which the port of Toledo possesses remains available for use.

Improvement of the river has been commenced by the community interested organized under State law into a port district, which has available about $44,000 to be applied directly to improvement in line with the above plan, making a contribution of about 60 per cent. The first cost of the work to the United States will therefore be about $28,800.

In the opinion of the district officer it is advisable for the United States to undertake this improvement on a basis of a 60 per cent contribution by the port of Toledo, either in cash or in useful work performed, subject to the condition that the floating plant belonging to the port be made available for the work and for maintenance without cost to the United States other than for upkeep while in use. He further states that if the work is authorized during the present session of Congress an initial appropriation of $10,000 would be sufficient, the balance to be provided in the next ensuing river and harbor act; otherwise the entire amount should be made available in a single appropriation.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report dated January 16, 1912, attention is invited. The board, with the division engineer, concurs in the recommendation of the district officer.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Yaquina River, Oreg., from Toledo to Yaquina, is deemed advisable so far as to secure an available channel depth of 10 feet at mean lower low water, 200 feet wide in Depot Slough, and 150 feet wide, increased to 200 feet on curves in the river, following in general the methods described in the report of the district officer, at an estimated cost of $72,000 for first construction and $3,000 biennially for maintenance, provided local interests contribute 60 per cent of the estimated first cost either in cash or useful work performed, prior to actual construction

Digitized by Google

work by the United States, and that the floating plant belonging to the port of Toledo will remain available for use by the United States on work of construction and of maintenance without cost to the United States other than for upkeep while in use. These estimates are based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation at the present session of Congress of $10,000, and a subsequent appropriation at the next session of $18,800, or preferably that the full amount of the estimated cost to the United States will be made available in a single initial appropriation.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF YAQUINA RIVER, OREG., FROM TOLEDO TO YAQUINA.

UNITED STATES ENGINEER OFFICE, FIRST DISTRICT,
Portland, Oreg., August 17, 1911.

SIR: In compliance with instructions contained in letter dated Office of the Chief of Engineers, Washington, April 7, 1911, assigning to this office the duty of making a preliminary examination of Yaquina River, Oreg., from Toledo to Yaquina, with report upon any proposition for cooperation by local interests, as authorized in the act of Congress approved February 27, 1911, I have the honor to make the following report:

The examination was made under direction of this office in May, 1911, by Mr. R. W. Williams, inspector. A public hearing was held at the office of the first Portland district on June 29, 1911, and representatives of various interests of the valley and a member of the port commission were present thereat.

PREVIOUS EXAMINATIONS.

The Yaquina River has been previously the subject of preliminary examinations, under provisions of former acts of Congress, and the reports on these examinations are printed in House Document No. 112, Fifty-fifth Congress, second session; House Document No. 240, Fifty-eighth Congress, second session; and House Document No. 351, Sixty-first Congress, second session. The first-mentioned document contains a map of the stretch of river which is the subject of this examination. As a result of all three examinations it was found and reported that the improvement desired was not worthy of being undertaken by the Federal Government.

GENERAL DESCRIPTION OF THE RIVER.

The Yaquina River is a small stream which takes its rise in the Coast Range of mountains in Lincoln County, Oreg., about 30 miles in a direct line from the Pacific Ocean. Twenty-one miles from its mouth it is joined by its principal tributary, Big Elk River, at the

Digitized by Google

small town of Elk City. The amount of fresh water carried by both streams is insignificant. The tidal influence extends about 5 miles above Elk City, which is as far as the stream may be considered navigable, and then only for skiffs and light-draft scows.

At Elk City the river is about 160 feet wide; between that point and the mouth of Depot slough, a distance of 9 miles, it gradually widens to about 800 feet. The controlling depth throughout this part of the river is about 3 feet at mean low tide, although many long stretches have depths of from 5 to 10 feet and even more at that stage.

Toledo is situated on Depot slough just above its junction with the river. From Toledo to Oysterville, 6½ miles downstream, the river varies in width from 800 to 1,200 feet, except at the first bend below Depot slough, where it is but 400 feet in width. The channel depths vary between 3 and 20 feet. Depths are in excess of 6 feet at low water except on five mud bars, the position, length, and depths of which are shown in tabulated form herewith.

	Distance below Toledo.	Length of bar.	Minimum depth at low water
	Miles.	*Mile.*	*Feet.*
First bar	(1)	½	3
Second bar	1½	½	5
Third bar	2	½	4
Fourth bar	3½	½	5
Fifth bar	5½	½	4

[1] At and below.

From Oysterville to Yaquina, 2½ miles, the channel has a minimum depth of 12 feet at low water, which depth prevails across Yaquina Bay and over the bar at the bay entrance. The town of Yaquina is about one-half mile above the head of the bay, which is about 3 miles long and about 1 mile wide.

To summarize, between Toledo and Yaquina, a distance of about 9 miles, the Yaquina River is a portion of a tidal estuary, with an average range of tide of about 6 feet and with a minimum depth of water of 4 feet at low tide, excepting at one long shoal immediately below Toledo, where there is but 3 feet depth.

RESOURCES AND DEVELOPMENT.

Yaquina is a small settlement and the terminus of the Corvallis & Eastern Railroad, which connects with the Southern Pacific system at Corvallis and Albany in the Willamette Valley. Toledo, the county seat, is on the railroad and has a population of about 800. Newport, near the bay entrance, has a population of about 600, but during the summer months is a resort of considerable size.

A narrow strip of bottom land borders the river and its tributary streams. Considerable clearing and settlement has occurred during recent years, but the valley has not as yet passed the sparsely settled stage.

There is a sawmill at Elk City and two at Toledo with a combined capacity of about 200,000 feet b. m. per day. There is a creamery at Toledo and a small salmon cannery at Oysterville.

Digitized by Google

The river and its tributary sloughs are used for logging purposes and by the farmers and others who own gasoline launches and small barges on which they transport wood, hay, and other products to market and bring back supplies. No record of this traffic is kept, but on account of the small population its amount and value can not be very great.

Two small gasoline seagoing boats make regular trips between Toledo and Portland, Oreg., carrying freight and passengers. No record has been kept, but it is stated that the yearly tonnage of merchandise, exclusive of lumber handled in this way, would not exceed 300 tons. About 12,000 tons of lumber are shipped out annually by water and a considerably larger tonnage by rail. Lumber will undoubtedly be the largest item of freight shipments, it being claimed that there are 12,000,000,000 feet of timber in the valley of the Siletz River, from 10 to 20 miles north of the Yaquina River, which should find an outlet to market by way of Depot and Olalla Sloughs. A logging road 4 miles long has already been built along Olalla Slough, and rights of way secured for another road along Depot Slough.

IMPROVEMENT DESIRED.

The improvement desired is the dredging of a channel through the various bars below Toledo to the deeper water in the bay and the construction of training dikes at a few places to concentrate the flow over the bars to obtain a channel of sufficient width and depth to allow small coasting schooners to load lumber at or near Toledo to a draft of about 15 feet at high tide.

To obtain this improvement the community is organized under State law into a port district, and has raised, by the issue of bonds, the sum of $50,000, and, under a permit from the War Department, has already undertaken the improvement. The funds are being applied to the purchase of 600 feet of water front at Toledo for public wharves, to the construction of two training dikes for channel control, and to the construction of a clamshell dredge with a dipper of 1½ yards capacity. The cost of these items will leave a balance of about $20,000, which the port proposes to use in the operation of the dredge on the various shoals. They desire that the Federal Government assist in the work by completing the work after the exhaustion of their funds, and enlarging the channels obtained in their work, and express a willingness to cooperate by loan or rental of their dredge, or upon any terms that may be reasonable.

There are no considerations in respect to terminal facilities, water power, or other collateral subjects that have any bearing on the scope of this examination, except as mentioned hereinbefore.

Conclusions and recommendations.

In view of the fact that the local interests have shown their confidence in the value of the improvement desired by entering upon the work, and have expressed their willingness to cooperate with the Federal Government upon any reasonable basis to secure its completion or extension, I am of opinion that a survey of the river

Digitized by Google

should be made to determine the cost of the improvement desired. The necessary survey can be made for the sum of $900, and is recommended.

Respectfully submitted.

JAY J. MORROW,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., August 21, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views expressed by the district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 5, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This examination is called for with a view to the improvement of the Yaquina River from Toledo to Yaquina in connection with local cooperation. The entrance to Yaquina Bay has been improved under a project adopted in 1880, which with subsequent modifications, provided for the construction of two jetties and the removal of a cluster of rocks beyond the end of the jetties. Under these projects there has been expended somewhat in excess of $700,000 and the work successfully completed, resulting in a channel 13 to 15 feet in depth at mean low tide, 21 to 22 feet at high tide. As no commerce resulted from this improvement, work was completely discontinued about 1905, since which time nothing has been done by the General Government.

The village of Yaquina is situated about one-half mile above the head of the bay, 4 miles above the bar at the entrance. Toledo is about 9 miles above Yaquina. On this portion of the river the minimum depth of water at low tide is 4 feet, excepting on one shoal immediately below Toledo, where there is but 3 feet. The range of tide is about 6 feet.

The improvement desired is an increase in channel depth over the reach sufficient to allow small coasting steamers to load lumber at or near Toledo to a draft of about 15 feet at high tide. The country tributary is sparsely settled, and there is very little commerce at the present time. There is a large potential commerce in lumber, and the purpose of the improvement is to permit this commodity to be marketed by water. To secure this improvement the community has been organized under State law into a port district, has raised by issue of bonds the sum of $50,000, and is now engaged under a permit from the Secretary of War in carrying on the work. The community desires that the United States take up the work after the

Digitized by Google

xhaustion of their funds and complete the project, with such further ›cal cooperation as may appear reasonable.

In view of the faith shown by the community in the success of the ›roject by the expenditure of their own funds, and the fact that ›ongress has called for consideration of local cooperation, the board oncurs with the district officer and the division engineer in recommending that a survey be authorized in order to determine the cost ›f improvement, and to secure full information upon physical and ›ommercial conditions and the further cooperation proposed by the ›ommunity, as the advisability of the United States entering upon ›he work is dependent upon these questions.

For the board:

S. W. ROESSLER,
Colonel, Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, September 12, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Yaquina River, Oreg., from Toledo to Yaquina, authorized by the river and harbor act of February 27, 1911.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

H. TAYLOR,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT,
September 13, 1911.

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF YAQUINA RIVER, OREG., FROM TOLEDO TO YAQUINA.

UNITED STATES ENGINEER OFFICE, FIRST DISTRICT,
Portland, Oreg., December 27, 1911.

SIR: I have the honor to submit the following report on the survey of the Yaquina River, Oreg., from Toledo to Yaquina, made under the provisions of the river and harbor act of February 27, 1911.

The preliminary report was submitted August 17, 1911; the survey was authorized by the Secretary of War September 13, 1911, and was completed in October, 1911. The field work was in local charge of Mr. James E. Kelley, with Mr. James S. Polhemus, assistant engineer, in general charge. The survey extended from Toledo to Oysterville, a distance of about 6½ miles, as this portion of the river contained all existing obstructions to prospective navigation, the depth below Oysterville being ample for all traffic that can enter the bay.

Digitized by Google

A description of the locality, of its resources, and of the history previous examinations is given in the preliminary report. To the description nothing has been developed that is necessary to be added excepting a statement of the commerce handled on the river during the year 1911, which is as follows:

Lumber	feet B. M.	3,000,[illegible]
Piles	linear feet	10,[illegible]
Cordwood and slab wood	cords	[illegible]
Merchandise	tons	1,[illegible]
Fruit and vegetables	do	
Miscellaneous	do	[illegible]

METHODS AND RESULTS OF THE SURVEY.

The survey was made in October, 1911, by Mr. James E. Kell[illegible] inspector. A transit line, on true bearings was run along the bar of the river, the necessary topography being taken with the stadia and soundings located by tag line. On the various shoals the bottom was probed to ascertain the proximity of bed rock. The tidal plane of reference, mean lower low water, was obtained by setting a gauge referred to the mean height of several low waters, as given by the tide tables of the Pacific coast.

A map of the work has been prepared on a scale of 1 to 4,000, in two sheets, which is forwarded herewith.

The survey shows a narrow channel in Depot Slough with low water depths ranging from 6 to 15 feet. Below the mouth of Depot Slough a shoal occurs to Mackays Point on which the controlling low-water depth is about 4½ feet. Going down the river, from opposite Bockman's place to a point a short distance below Hansens, the controlling low-water depth is about 6½ feet. There is a very shallow shoal below with a low-water depth of 8½ feet, and a last one opposite McIntyre's wharf with a controlling low-water depth of 7½ feet. Below this point the depths are sufficient for any vessel that can cross the ocean bar, as can be seen by reference to the Coast and Geodetic Survey chart of Yaquina Bay. The bottom appears to be mud and silt, and the investigations did not indicate that any difficulty from rock bottom would be encountered in dredging to 10 feet below mean lower low tide.

The two dikes built last spring are shown on the map. They do not appear to have been long enough in place to have had any effect on the channel depths.

IMPROVEMENT DESIRED BY THE LOCALITY.

The citizens of the locality have organized into a port district under the State law, and desire to have the channel of the Yaquina River and Depot Slough so improved that vessels which can cross the bar at the entrance to the bay can pass unobstructed up to Toledo, where the principal sawmills are located, and from which point it is expected to ship much of the lumber manufactured from the standing timber of the Siletz watershed. Fifty thousand dollars have been realized by the sale of bonds of the port of Toledo, and work has been commenced and is in progress under a permit from the Secretary of War. Up to the present time the port has expended a portion of the funds (about $30,000) in purchasing about 600 feet of water front at Toledo.

Digitized by Google

for a public dock, the building of two half-tide pile and brush training dikes in the Yaquina River, and in the construction of a bucket dredge of 1½ cubic yards dipper capacity. The dredge cost about $16,000, and appears to be an efficient machine of its kind, capable of removing from 800 to 900 cubic yards per day. It has just been started at work on the shoal at the mouth of Depot Slough.

About 12 feet at mean lower low water is a fair average of the controlling depth on the Yaquina Bar, with a mean rise of tide above this plane of about 7.2 feet, so that vessels loaded to about 14 feet ought to be able to navigate the bar safely at high water, and if the low water controlling depth to Toledo is made 10 feet, should be able to pass on up the bay and river to that point without difficulty at high tide.

The estimate has been prepared for dredging a channel through the various shoals to a depth of 10 feet at mean lower low water, and with a bottom width of 150 feet in straight reaches and 200 feet on the curves, from the deep water above Oysterville to a point just below the Fir & Spruce Lumber Co.'s dock in Toledo.

The port of Toledo has built the dikes authorized by their permit, and is operating the dredge within the lines of the project covered by the following estimate. The dredge has a 95-foot boom, and it is proposed to deposit a considerable portion of the spoil to one side of the cut where the latter lies close to shoals or to the shore. Two small side dump scows of a capacity of about 100 cubic yards each would seem to be suitable for transporting such portions of the spoil as would require it to points where it would not likely be returned to the channel. Their cost, about $2,000 each, is included in the unit price for excavation, 10 cents per yard, and can be covered, judging from actual costs of the work already done. It is estimated that with this plant about two years will be required to do the work.

The estimate is herewith:

Building of two pile and brush dikes (already constructed) about	$8,500
Purchase of bucket dredge and equipment, about	16,000
Dredging a channel about 200 feet wide and 10 feet deep at mean lower low water in Depot Slough, from Toledo to its mouth, 131,400 cubic yards excavation, at 10 cents	13,140
Dredging a channel from 150 feet to 200 feet wide and 10 feet deep at mean lower low water from the mouth of Depot Slough to a point just above Oysterville, 270,000 cubic yards of excavation, at 10 cents	27,000
Engineering, superintendence, and contingencies	7,360
Total	72,000

It is further estimated that an expenditure of about $3,000 every two years will be required for maintenance, provided the small dredge which the port possesses will remain available for use, as is probable.

The port has available for this work, including the accomplished work, about $44,000, the remainder of their fund of $50,000 having been expended or pledged for work not included in this estimate. This sum is, roughly, 60 per cent of the estimated cost. The port desires the United States to complete the work by taking over, free of rental, their plant and executing the remainder of the work in part from the funds of the port from the time of the adoption of the project. They have made this proposal in writing, a copy of their letter being forwarded herewith.

Digitized by Google

CONCLUSIONS AND RECOMMENDATIONS.

The proposition made by the port of Toledo resolves itself into a request that the United States take up and complete a project on which they have shown their faith by providing for about 60 per cent of the work. Or, stated in another way, they are providing the necessary plant and executing about half the work, requesting the United States to execute the other half with only such cooperation on their part as is involved in allowing the free use of a suitable plant, the first cost of which does not differ greatly from the estimated total expense to the United States.

Although the country is sparsely settled and though the present commerce is small, I am of opinion that the completion of the work herein outlined will cause a considerable increase in the water-borne lumber business, and that the project is worthy of being undertaken by the Federal Government on the basis of a 60 per cent contribution by the port of Toledo, either in cash or in useful work performed, subject to the condition that floating plant belonging to the port be available for the work and for maintenance, without cost to the United States other than for upkeep while in use.

The total cost of the improvement to the United States, viz. $28,800, should be provided for use within two years. As the port of Toledo has accomplished part of the work and will continue it until the exhaustion of their funds, it will not be necessary for Congress to appropriate more than $10,000 should the project be adopted during the present session, the remainder to be appropriated during the final session. Should the project, however, not be adopted until the final session of the existing Congress, the entire sum will be required.

There are no considerations in respect to terminal facilities, water power, or other collateral subjects that are germane to the examination and survey, except as briefly outlined in the report on the preliminary examination.

Respectfully submitted.

JAY J. MORROW,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., December 30, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views expressed by the district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

Digitized by Google

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 16, 1912.

Respectfully returned to the Chief of Engineers, United States .rmy.

A survey of Yaquina River having been made, the district officer ıbmits a project for dredging through the various shoals to a depth f 10 feet at mean lower low water, with a bottom width of 150 feet ı straight reaches and 200 feet on the curves, from the deep water bove Oysterville to a point just below the Fir & Spruce Lumber Co.'s ock in Depot Slough at Toledo. The estimate is as follows:

Building 2 pile and brush dikes (already constructed), about	$8,500
Purchase of bucket dredge and equipment, about	16,000
Dredging	40,140
Engineering, superintendence and contingencies	7,360
Total	72,000

It appears that under a permit from the Secretary of War, the mprovement of the river, in substantial accord with the above project, has been commenced by the port of Toledo and is now in progress. Up to the present time the port has expended about $30,000 in purchasing a frontage at Toledo for a public dock, building the two dikes n the Yaquina River, and constructing a bucket dredge, which has ust been started at work. The port desires the United States to complete the work by taking over their plant free of rental and executing the remainder of the work, in part from the funds of the port, from the time of the adoption of the project. Of the $50,000 originally raised by the port it is proposed to apply about $44,000 directly to improvement in line with the above estimate, making a contribution of about 60 per cent. The cost of the work to the United States will be about $28,800. The district officer estimates that an expenditure of about $3,000 every two years will be required for maintenance, provided the small dredge which the port possesses will remain available for use..

Although the country is sparsely settled and the present commerce is small, the district officer is of opinion that the completion of the work outlined will cause a considerable increase in the water-borne lumber business and that it is advisable for the Federal Government to undertake the improvement on the basis of a 60 per cent contribution by the port of Toledo, either in cash or in useful work performed, subject to the condition that the floating plant belonging to the port be available for the work and for maintenance, without cost to the United States other than for upkeep while in use. After consideration of the information presented, the board joins the division engineer in concurring in the opinion that it is advisable for the United States to undertake the improvement under the conditions specified by the district officer. If the work is authorized during the present session of Congress, an initial appropriation of $10,000 is recommended, the balance to be provided in the next ensuing river and harbor appropriation act. Otherwise the entire amount should be made available in a single appropriation.

In compliance with law, the board reports that there are no questions of water power involved in this investigation, and, except as proposed above, there are no questions of terminal facilities or other

Digitized by Google

related subjects which could be advantageously coordinated w[illegible] the recommended improvement to lessen the cost and compens[illegible] the Government for expenditures made in the interests of navi[illegible] tion.

For the board.

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

LETTER OF PORT OF TOLEDO.

TOLEDO, OREG., *December 20, 1911*

SIR: I have the honor to submit to you the following proposition on behalf of [illegible] commission of port of Toledo for the projected improvement of Depot Slough and [illegible] Yaquina River from the Fir & Spruce Mill Co. wharf at Toledo, Oreg., to Oyster[illegible]

We will bear 60 per cent of the cost of such improvement based upon the plans [illegible] estimates made by your department and will furnish the use of our dredging pl[illegible] now in operation on said project free of cost to the United States. Providing [illegible] the port of Toledo be given credit for the expenditures made by it upon the pr[illegible] up to the time the project is assumed by the United States Government as sho[illegible] by our vouchers therefor.

Respectfully submitted

THE PORT OF TOLEDO.
J. F. STEWART, *Vice president.*

Maj. J. J. MORROW,
Corps of Engineers.

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 520.

SOUTH RIVER, N. J., BETWEEN BISSETTS AND OLDBRIDGE.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF EXAMINATION AND SURVEY OF SOUTH RIVER, N. J., BETWEEN BISSETTS AND OLDBRIDGE.

FEBRUARY 8, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 7, 1912.

SIR: I have the honor to transmit, herewith, a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copies of reports from Col. Wm. T. Rossell, Corps of Engineers, dated December 21, 1910, and December 21, 1911, with map, on preliminary examination and survey, respectively, of South River, N. J., made by him in compliance with the provisions of the river and harbor act, approved June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 6, 1912.

SIR: I have the honor to submit herewith for transmission to Congress reports dated December 21, 1910, and December 21, 1911, with map, by Col. William T. Rossell, Corps of Engineers, on preliminary examination and survey, respectively, of South River, N. J., with a view to deepening of the channel between South River and Old-

Digitized by Google

bridge to a depth of 6 feet, called for by the river and harbor act of June 25, 1910.

South River has been under improvement by the United States for a number of years under a project resulting in a channel 100 feet wide and 8 feet deep up to South River (also known as Washington), 1.5 miles above the mouth, and 6 feet deep thence to Bissetts, 2.2 miles farther. The upper reach of the river, from Bissetts to the head of navigation at Oldbridge, 2.6 miles, is covered by an existing project which contemplates a depth of 4 feet, but no work thereunder has been undertaken.

The district officer presents a plan for securing, by means of dredging, a channel 6 feet deep from Bissetts to Oldbridge, which is estimated to cost $87,000, which is practically equal to the unappropriated balance of the original estimate for cost of completion of the old 4-foot project. The annual cost of maintenance of this entire stretch of river, if improved as recommended, is estimated at $8,000.

The district officer reports that improvement of the stream has already caused great reduction in freight rates, and that it appears probable that further reductions will result when the improvement reaches the upper stretch of the river. For this reason and the good prospect of a material increase in commerce he recommends the modification of the existing project so as, without any material increase in estimate, to provide for a depth of 6 feet above Bissetts instead of the original 4 feet, and that the entire cost thereof be made available in a single appropriation.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report, dated January 16, 1912, attention is invited. The board concurs with the district officer, who is also division engineer, in recommending this improvement.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of South River, N. J., between Bissetts and Oldbridge, is deemed advisable so far as to secure an available channel depth of 6 feet and a channel width of 100 feet increased on curves, following in general the methods described in the report of the district officer, at an estimated cost of $87,000 for first construction and $3,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost. It is suggested that this additional improvement be adopted as a modification of the existing project for South River, and that maintenance of the improvement of the entire river be provided for in one sum of $8,000 annually.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

Digitized by Google

:ELIMINARY EXAMINATION OF SOUTH RIVER, N. J., BETWEEN BISSETTS AND OLDBRIDGE.

UNITED STATES ENGINEER OFFICE,
New York City, December 21, 1910.

SIR: I have the honor to submit the following report upon a pre-
ninary examination of South River, N. J., with a view of deepening
e channel between South River and Oldbridge to a depth of 6 feet,
ade in compliance with department letter dated August 4, 1910,
d pursuant to the requirement of the river and harbor act ap-
oved June 25, 1910.

The South River is a small tidal stream rising in the central part
the State of New Jersey, flowing in a general northwardly direc-
on and emptying into the Raritan River about 8 miles above its
outh at South Amboy and about 4 miles below the city of New
runswick. For the lower 6 miles of its course from Oldbridge
its mouth it is very crooked, with low marshy banks similar to
ost marsh tidal streams. This part of the river has always been
avigable, but at Oldbridge farther navigation for masted vessels
prevented by a highway bridge without a draw, but small boats
n get up a mile or two farther, where navigation and tidal flow
re cut off by a low dam. About 1830 the New Jersey Transportation
o. cut a canal, known as the Little Washington Canal, 4,500 feet
ng, from the Raritan River at Sayreville, about 7 miles above its
outh, to intercept the South River at a point 2½ miles by channel
bove its mouth, which resulted in a saving of a distance of about
miles in the river route from New York and the East to Washing-
on and other points on the South River above Washington. The
roposed depth of the canal was 6 feet at mean low water, but this
epth was not obtained at that time. The village of Washington,
lso called South River, is about half a mile above the head of the
anal, or a point where it joins the South River. The range of the
ide in the South River is 5.3 feet at Sayreville and 4.57 feet at Old-
ridge.

A survey of the South River was ordered by Congress in 1870.
he report on this survey, printed in the Annual Report of the Chief
f Engineers for 1871, page 698, proposed making a depth of 6 feet
t mean low water up to the Washington wharves by dredging
hrough the canal, and through two shoals above the canal, and
naking some minor improvements between Washington and Old-
ridge, at a total estimated cost of $13,600. This project was
dopted in 1871, and appropriations of $15,000 in 1871 and $5,000
n 1873 applied to executing the proposed work below Washington,
nd resulted in making a channel of 6 feet to that point.

The river and harbor act of 1879 directed a survey of South River
etween Raritan River and Oldbridge. The report on this survey
s printed in the Annual Report of the Chief of Engineers for 1880,
age 519, and it provides for making a channel 100 feet wide and
feet deep at mean low water from Raritan River through the canal
o Washington, 1¼ miles; thence to Bissetts, 6 feet deep, 3⅝ miles;
nd thence to Oldbridge, 4 feet deep, 6¼ miles from Raritan River,
o be obtained by dredging and diking, at a total estimated cost of
$194,695. By act of June 14, 1880, the above project was adopted.
In 1892 the project was so modified as to substitute for certain dikes

Digitized by Google

and a cut-off above Washington sufficient dredging in the natural channel to accomplish the same object, and to omit closing of old river channel below the head of the canal. The estimated cost was in consequence reduced from $194,695 to $176,975, and this is now the estimated cost of the improvement. When this project was adopted the depth in the canal had decreased to 3.3 feet. Above Washington the available depth was about 2¾ feet to Bissetts and about 2½ feet from Bissetts to Oldbridge.

The amount expended on the present project has been $120,812.84 of which $89,336 was used for carrying out the project and $31,476.8[illegible] for maintenance.

The following work on this improvement has been accomplished:

Below Washington: The projected dikes have been constructed and a channel dredged 50 to 75 feet wide and 7½ to 8 feet deep through the canal and to Washington. This was the condition on July [illegible] 1896. Subsequently, when funds were available, the channel was redredged, with widths of 50 to 100 feet at places where shoaling has occurred.

Washington to Bissetts: At the close of work in November, 190[illegible] under allotments from the appropriations of March 3, 1905, and March 2, 1907, the proposed channel, 100 feet wide and 6 feet deep mean low water, had been completed from Washington toward Bissetts, a distance of 1½ miles, and further extended toward Bissetts with widths of 85 and 50 feet, additional distances of 640 and 1,8[illegible] feet, respectively, which carried it to a point 340 feet below Bissetts docks.

Bissetts to Oldbridge: No work has been done.

This preliminary examination covers the part of the river between the towns of South River, formerly Washington, and Oldbridge, a distance of about 5 miles. The improvement, under the existing project, has been carried nearly to Bissetts, with depth of 6 feet, and this depth will be restored with funds at present available. From Bissetts to Oldbridge, a distance of about 2¾ miles by course of river nothing has been done, and the river remains in practically the same condition as reported in 1871 and 1880, as mentioned above. There are two drawbridges crossing the river between the mouth and Oldbridge—the highway bridge at South River and the Raritan River Railroad bridge, about half a mile above the highway bridge. These have draw openings of 34 and 40 feet, respectively.

The commercial statistics of the South River from Bissetts to Oldbridge, including Bissetts, which amounts to about one-third of the tonnage and one-quarter of the value, is as follows:

Commercial statistics, fiscal year ending June 30, 1910, South River to Oldbridge.

	Shipments.	
	Short tons.	Valuation.
Bissett's brick yard	8,100	$14,9[illegible]
Smith Manure Co	11,327	12,[illegible]
Brookfield Glass Co	7,[illegible]	31,6[illegible]
Total	27,327	61,[illegible]

Digitized by Google

The shipments consist of—

	Short tons.	Valuation.
al	1,333	$3,640
ick	7,788	16,808
anure	11,617	13,264
iscellaneous	6,589	27,840
Total	27,327	61,552

Vessels arriving and departing.

	Number of trips.	Draft.	Tonnage.
		Feet.	
eam	87	5-6	.....
alling	30	6	200-300
arges	57	5-7	200-300

In addition to tabulated shipping, Brookfield Glass Co. occasionally sends out 300-ton barge loads of sand.

Oldbridge Enameled Brick & Tile Co. says it would ship about ,000 tons annually of its boxed output by water, providing the channel was navigable so that transportation would be easy and rates reasonable. Its incoming freight amounts to 7,500 tons annually in oal, clay, and broken tile, a large portion of which would be brought by water route. A 6-foot channel to Oldbridge would facilitate hipping of large quantities of farm produce and timber. At present he produce must be carted from 7 to 10 miles to boats, unless higher ates are paid for rail shipments, in which event it reaches the market n bad condition owing to necessary rehandling. Timber, formerly ent by boat, now stands uncut, a prey to fires, because high railroad ates leave no profits.

At present boats can navigate the river only at high tide, and boatmen do not care to do that owing to trouble and risk. This is shown by their rates: $50 for towing barge load of 500 tons from New York City to South River and $70 for towing 250-ton barge load from New York City to points a short distance up the South River.

TERMINAL AND WHARF FACILITIES.

No wharves owned by public.

Rail conections possible in wharves existing.

No private wharves with privileges extended to public.

No public space available for wharves.

Facilities existing and not open to public are Smith's, Brookfield's, and Bissett's docks. Also disused tramway dock of brick plant not operating, situated between Bissetts and Brookfields.

Steep banks allow easy loading, and old bulkhead at Oldbridge, from which loading was previously done, is still intact. Land privately owned could be obtained for docking purposes.

The improvement proposed, dredging for deepening the channel, would have no connection with the subject of water power and but little with floods or land reclamation. The material dredged might

Digitized by Google

be used for filling private moist lands, but that disposal would not affect the cost of the work.

In my opinion the improvement desired is worthy to be carried out by the General Government and it appears that it can be accomplished by making it an extension of the existing project. This project, as before stated, provides for a low-water depth of 6 feet and width of 100 feet from Washington to Bissetts, and the same width and 4 feet depth from Bissetts to Oldbridge. The depth is insufficient for existing commerce; moreover, it has been shown by comparison of bids for making depths of 4, 6, and 8 feet in this district that the cost of a 6-foot channel would not be greater than that of a 4-foot channel, provided that the dredging is extended over an equal area in either case.

In order to ascertain the cost of the 6-foot channel, a new survey and estimate will be required from Bissetts to Oldbridge, as the survey of 1880, upon which the present project is based, can not be relied upon either as to quantity or cost of work at the present time. The cost of the necessary survey with borings to determine the character of the material to be dredged, which is not given with the survey, would be about $500.

Very respectfully, your obedient servant,

WM. T. ROSSELL,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 4, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This is a report on preliminary examination of South River, N. J., with a view of deepening the channel between South River and Oldbridge to a depth of 6 feet. The existing project for this stretch of the river provides for a channel 6 feet in depth and 100 feet in width from Washington or South River to Bissetts, a distance of about 3⅝ miles, and the same width, and 4 feet in depth from Bissetts to Oldbridge, a distance of about 2¾ miles. The improvement contemplated is an increase in depth to 6 feet over the latter stretch.

For reasons given, the district officer, who is also division engineer, believes the improvement is worthy of being carried out by the General Government and he recommends that a survey be authorized. It seems from the information furnished that the additional depth now desired would be of material benefit to the navigation interests on this stream, and the board is of opinion that the work contemplated is advisable, provided the cost is not found to be unreasonable. The board therefore concurs in recommending that a survey be authorized in order to determine the cost.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Pro tem.

Digitized by Google

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 13, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of South River, N. J., authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for River and Harbors in the preceding indorsement, I recommend that a survey of the locality, i. e., between the towns of Bissetts and Oldbridge, as proposed, be authorized.

EDW. BURR,
Acting Chief of Engineers.

[Fourth indorsement.]

WAR DEPARTMENT,
January 14, 1911.

Approved:

ROBERT SHAW OLIVER,
Assistant Secretary of War.

SURVEY OF SOUTH RIVER, N. J., BETWEEN BISSETTS AND OLDBRIDGE.

UNITED STATES ENGINEER OFFICE,
New York City, December 21, 1911.

SIR: In compliance with instructions contained in letter of the Chief of Engineers dated January 17, 1911, I have the honor to submit the following report upon a survey of South River, N. J., with a view of deepening the channel between South River and Oldbridge to a depth of 6 feet, for which provision is made in section 3 of the river and harbor act approved June 25, 1910.

This survey was made in connection with the examinations in progress at the locality during dredging operations under contract for the improvement of the river, and the cost of the survey was thereby much reduced. The results of the survey are exhibited on the accompanying map. The shore lines were relocated and soundings and borings taken in detail to show depth of water and character of bottom.

The 6-foot channel from the town of South River to Bissetts was nearly completed this season, leaving the stretch of the river from Bissetts to Oldbridge, a distance of about 2½ miles, to be improved under existing project of June 14, 1880. That project provides for diking and dredging to obtain a depth of 4 feet at mean low water and width of 100 feet.

The estimate submitted provides for dredging only to obtain a depth of 6 feet, with width of about 100 feet. The banks of the river are more stable than formerly and have been bulkheaded in many places, and at Old House Cove the old river bend has been straightened considerably and now requires no cut-off as proposed

Digitized by Google

under project of 1880, and dredging alone will now suffice to complete the improvement.

The material to be removed is principally clay, sand, and gravel.

Under the old estimate the amount required for completion of existing project is $87,359, as also mentioned in paragraphs 3 and 4 of report upon preliminary examination.

The improvement of the river to Bissetts may be regarded as practically completed and maintenance only is required.

If the full amount required for the completion of this improvement under existing project can be appropriated in one sum the 6-foot channel with width of about 100 feet can probably be extended to Oldbridge without an additional estimate of cost.

Estimate for a channel 6 feet deep at mean low water and about 100 feet wide from Bissetts to Oldbridge.

Dredging 260,000 cubic yards of material, at 30 cents per cubic yard, scow measurement	$78,000
Engineering and contingencies	9,000
Total	87,000
Annual maintenance (whole river now $5,000)	8,000

In my opinion the South River is worthy of improvement by the General Government to the extent of providing a 6-foot channel to Oldbridge in accordance with the foregoing estimate.

Very respectfully, your obedient servant,

WM. T. ROSSELL,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 16, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

A survey of South River, N. J., from South River to Oldbridge has been made. It appears that a channel 100 feet wide and 6 feet deep has already been provided to Bissetts, and the district officer who is also division engineer, presents an estimate for a channel 6 feet deep at mean low water and about 100 feet wide from Bissetts to Oldbridge, at an estimated cost of $87,000. He believes the locality worthy of improvement by the Federal Government to this extent. As explained in the report on preliminary examination, and within, this upper reach of the river is covered by an existing project which provides for a depth of 4 feet, but no work toward its execution has been undertaken. It appears that the estimated cost of completing the whole project is $87,359, and as practically all the work contemplated below Bissetts, the foot of the reach under consideration, has been completed, it will be seen that the estimated cost of the 6-foot project now proposed is practically the same as the amount authorized for the completion of the 4-foot project.

The total commerce on this river exceeds 100,000 tons, having a value of over $400,000. The report of the Chief of Engineers for the

Digitized by Google

fiscal year ending June 30, 1911, states that the improvement has caused a great reduction in freight rates, and it appears probable that the rates will be further reduced when the improvement reaches the upper stretches of the river. The present commerce on the upper reach is reported at 27,327 tons, with a very good prospect of a material increase if the river is given greater depth as proposed.

The board concurs with the district officer in the opinion that an increase to 6 feet in the depth of the improvement from Bissetts to Oldbridge is advisable, and therefore recommends that the present project be modified to provide a channel of this depth approximately 100 feet in width from South River to Oldbridge, at an estimated cost of $87,000. It is stated that the present estimate for maintenance is $5,000, and that this item will be increased to $8,000 by the adoption of the additional improvement proposed. The whole amount for construction should be made available in one appropriation. In compliance with law, the board reports that there are no questions of waterpower, terminal facilities, or other subjects which could be so coordinated with the project proposed as to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 528.

CAPE LOOKOUT, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATIONS OF CAPE LOOKOUT, N. C., WITH A VIEW TO DETERMINING ITS RELATIVE ADVANTAGE AND VALUE AS A SITE FOR A HARBOR OF REFUGE, AND ITS AVAILABILITY AND ADAPTABILITY AS A COMMERCIAL HARBOR.

FEBRUARY 8, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, February 7, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 5th instant, together with copies of reports from Capt. (now Maj.) Earl I. Brown, Corps of Engineers, dated December 12, 1910, on examinations of Cape Lookout, N. C., made by him in compliance with the provisions of Senate concurrent resolution 21, of February 21, 1910, and the river and harbor act approved June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., February 5, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, report dated December 12, 1910, by Capt. (now Maj.) Earl I. Brown, Corps of Engineers, prepared in compliance with Senate concurrent resolution 21, dated February 21, 1910, as follows:

Resolved by the Senate (the House of Representatives concurring), That the Secretary of War is hereby authorized and directed to cause a further and supplemental examination to be made of Cape Lookout, North Carolina, provided for in the river and harbor

Digitized by Google

act of March third, nineteen hundred and nine [printed in H. Doc. No. 315, 61st Cong. 2d sess.], with a view to determining its relative advantage and value as a site for harbor of refuge for coastwise and deep-draft vessels as compared with other localities on the coast of North Carolina, especially the harbors of Beaufort, Southport or Cape Fear, and Cape Hatteras, and to submit the results of such examination, together with estimates of cost, to Congress at the earliest date practicable.

There is also submitted herewith a report likewise dated December 12, 1910, by Capt. Brown on Cape Lookout Harbor, with a view to determining its availability as a commercial harbor, prepared in compliance with a provision in the river and harbor act approved June 25, 1910. The questions involved in these two proposed improvements are so interrelated that I deem it desirable to cover both subjects in one report.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors from whose accompanying report dated January 8, 1912, the following is quoted:

The two vital questions in determining the advisability of a harbor of refuge are first, the necessity for such a harbor and, second, the choice of location. Special efforts have been made by the board to solve these questions. It issued circular letters to all the principal navigation and trade associations, coastwise steamship lines, vessel owners, etc., between Boston and New Orleans, requesting their views as to the best location for a harbor of refuge on the coast of North Carolina, made an inspection of Cape Hatteras and vicinity on October 11, 1911, of Cape Lookout on November 1, 1911, and on the latter date held a duly advertised hearing in the town of Beaufort, N. C., which was attended by a large number of interested persons, including representatives of maritime interests from Boston and New York who were delegated to appear before the board in connection with this matter. It appears from data on hand that of 226 masters of vessels, 190, or 84 per cent, advocate Cape Lookout in preference to Cape Hatteras, and that maritime interests other than ship masters are practically unanimous in favor of Cape Lookout. A representative of 22 steamship companies, involving practically all the south Atlantic coastwise steamship business, appeared before the board in favor of Cape Lookout. In addition, boards of trade, chambers of commerce, maritime exchanges, boards of underwriters, insurance companies, and others interested in the general commerce of the country, and particularly in the maritime commerce to the number of 45 are on record as favoring Lookout. Expressions of opinion favoring Hatteras are practically confined to a few individual masters of vessels.

* * * * * * *

The board concurs with the district officer and the division engineer in the opinion that the construction of a harbor at Cape Lookout for commercial purposes alone is not warranted, but it believes that the establishment of a harbor of refuge is advisable, and that such a harbor in this locality would naturally lead to some commercial development that would add to the value of the improvement.

The estimated cost of a breakwater to form a harbor of refuge at Cape Lookout is given by the district officer, is $3,526,600. The estimate is based upon surveys made in 1897 and 1899, and while deemed sufficient for present purposes, it is probable that actual surveys and further study regarding location, type, and dimensions of breakwater, which should be given, will somewhat alter these figures. * * *

In conclusion, the board reports that in its opinion it is advisable for the General Government to establish a harbor of refuge at Cape Lookout, N. C., at an approximate cost of $3,526,600, with the understanding, however, that further study will be given to the engineering features of the project before actual work is commenced. It is recommended that the sum of $500,000 be made available in the first appropriation and that contract authorization be given for the balance with a view to completing the work in four years.

After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress I report that the construction of a harbor at Cape Lookout for commercial purposes alone is not warranted, but that the establishment of a harbor of refuge at this locality by the United States is deemed advisable, following in general the plan described in the report of the

Digitized by Google

district officer at an estimated cost of $3,526,600 for first construction, this estimate being based on the supposition that the work will, as now seems desirable and advantageous, be prosecuted under a first cash appropriation of $500,000, with contract authorization for the balance with a view to completing the work in four years. If funds are not provided in such amounts and at such times as will permit of an economical prosecution of the work the cost may be considerably greater than the amount stated. This recommendation is based on the understanding that further study will be given to the engineering features of the project before actual work is commenced, and that such features are subject to such modifications as may be deemed advisable.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

SUPPLEMENTAL EXAMINATION OF CAPE LOOKOUT, N. C., WITH A VIEW TO THE CONSTRUCTION OF A HARBOR OF REFUGE.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., December 12, 1910.

SIR: I have the honor to submit the following report in compliance with instructions contained in first indorsement, Office Chief of Engineers, dated February 25, 1910, on wrapper inclosing Senate concurrent resolution No. 21, Sixty-first Congress, second session, supplemented by further instructions contained in fourth indorsement, Office Chief of Engineers, dated August 6, 1910.

The Senate concurrent resolution referred to above reads as follows:

Resolved by the Senate (the House of Representatives concurring), That the Secretary of War is hereby authorized and directed to cause a further and supplemental examination to be made of Cape Lookout, North Carolina, provided for in the river and harbor act of March third, nineteen hundred and nine, with a view to determining its relative advantage and value as a site for a harbor of refuge for coastwise and deep-draft vessels as compared with other localities on the coast of North Carolina, especially the harbors of Beaufort, Southport, or Cape Fear and Cape Hatteras, and to submit the results of such examination together with estimates of cost to Congress at the earliest date practicable.

After independent investigations made by this office and by the Board of Engineers for Rivers and Harbors, as given in their report dated July 11, 1910, the conclusion has apparently been reached by both that there is but one locality on the coast of North Carolina that can compare in value and advantages with Cape Lookout as a site for a harbor of refuge for coastwise and deep-draft vessels, that locality being Cape Hatteras.

Many letters have been sent broadcast to seafaring men and agents of seagoing vessels, and their opinions are found to be almost unanimous in favor of either Cape Lookout or Cape Hatteras, with perhaps a slight majority in favor of the former, perhaps on account of its present known value as a harbor.

Harbors of refuge should afford adequate protection from all winds, and should afford ample anchorage room for all vessels liable to seek their protection. They should present an opening capable of admit-

Digitized by Google

ting vessels from any direction of approach liable to be used; should offer an entrance sufficiently wide to afford every reasonable opportunity for such vessel to enter, and should afford sufficient depth to allow all vessels to freely ride at their anchors. Such harbors are usually located on or near the most dangerous sections of the coast where disasters to shipping are most liable to occur. They may be located on a straight stretch of coast, on a projection of the land into the sea, or in an embayment.

If the coast is reasonably straight between any two commercial harbors widely separated, and on which there were no particularly dangerous localities, a harbor of refuge would probably be located about midway between the two. If between two such commercial harbors there were one or two prominent capes or projections of the land into the water, the harbor would probably be located at or near one of these, and it appears that all other considerations being equal it should be located at or near that projection which was notoriously the most dangerous to shipping.

It does not appear that the location of such a harbor in an embayment should ever be recommended unless under very exceptional circumstances, because as soon as a vessel running before a storm enters the bay it must either find a harbor or go ashore, as its maneuvering space is immediately restricted by the projections which form the bay.

For similar reasons it also appears that such a harbor should be an exterior harbor, that is built out on a projection from the coast line into the water rather than formed behind the coast line in a recess.

The general trend of the coast of the United States from New York to the Capes of Chesapeake Bay is southwest. A change to the southeast occurs there, and continues nearly to Cape Hatteras on the coast of North Carolina. Here it resumes its original direction and continues southwest generally to the Savannah River. The general regularity of the coast line is thus seen to be broken by the projection of that portion of the North Carolina coast on which is located Cape Hatteras, Capes Lookout and Fear being located on minor projections of a receding coast line, and hence further from the general line of ocean travel which rounds Hatteras as closely as possible.

From each of the three Capes, Hatteras, Lookout, and Fear, there extends for 12 to 25 miles out to sea a sand shoal, which, in spite of being of a shifting nature, and being in motion nearly all the time, remains in practically the same location.

The causes which have formed and which maintain these shoals are uncertain. The Gulf Stream passing up through the straits of Florida parallels the shore in a way as far north as Cape Hatteras. An examination of the contours of its bed shows it to be much flatter in contour than the coast; hence although the stream undoubtedly has an effect these effects are modified by other causes. From Baffins Bay down to Cape Hatteras there is known to exist a cold littoral current, which disappears at the latter point, its waters mingling with or descending below those of the Gulf Stream. The waters of the Gulf Stream itself are subject to the actions of storms and winds, varying to the eastward or to the westward at their sport. Its velocity off this coast is about 1 mile per hour; its distance from Cape Fear is 50 miles, from Cape Lookout 30 miles, and from Cape Hatteras 20 miles. At the latter point where the cold northern current disappears, and where the Gulf Stream departs from the American

Digitized by Google

ast, there is undoubtedly formed an eddy which has given rise to e formation of the Diamond Shoals, which on account of their ominent location have been so disastrous to shipping. Lookout oals on Cape Lookout and Frying Pan Shoals on Cape Fear appear have been formed in a similar manner from eddies resulting from e action of the Gulf Stream and the tidal wave which is projected rice daily across the Atlantic Ocean. This wave appears to first uch the coast of North Carolina on the beak of Cape Hatteras, hich divides it into two parts, setting up currents which tend northard and southward. Those going northward, however, are soon utralized by the wave sweeping down the Virginia coast from the rth. Those going south are modified by the capes and eddies from e Gulf Stream so as to increase apparently the eddy action and aintain the shoals.

Cape Hatteras being situated farthest out from the general coast e and being farther extended by Diamond Shoals has been a eater menace to navigation than the other capes and their shoals. l vessels going north or south must round these shoals, and in order save distance they usually come as close in as is consistent with fety. Off this cape a change of direction is made, whether going rth or south, and an error in making it too soon is usually fatal, as e vessel strikes Diamond Shoals, from which it can seldom be freed. e other two capes are passed at quite safe distances, as they are t right on the usual track of north and south bound vessels. It is ly the vessel blown out of its course or bound for one of the ports uated under their lee that is in much danger of striking on them. It would appear, therefore, that, all other things being equal, Cape atteras would be the preferable locality for such a harbor of refuge is proposed. A comparison of the physical features of the two calities shows that a small degree of protection is now afforded om westerly to northeast winds under the lee of both capes, but e construction of long and expensive breakwaters will be necessary protect the harbor from easterly to southwest winds; that both ve excellent holding ground for ships at anchor; that the condions of approach to both harbors are practically the same; that the oblem of shifting sand which might engulf and destroy a breakater is a more serious one, and needs more careful study and attenn at Cape Hatteras than at Cape Lookout; that deep water is mewhat farther off shore in Hatteras Cove than at Lookout Bight, that a somewhat larger and more expensive structure would be eded to protect it; and that, on account of being more remote from ilway facilities and more difficult of access, the unit cost of material ill be somewhat higher at Cape Hatteras.

Careful surveys of Cape Lookout Bight made in 1897 and 1899 able quite accurate estimates of material to be made for a harbor Cape Lookout, and an estimate based on those surveys will be und in House Document No. 80, Fifty-sixth Congress, first session. As there was no information available as to the physical characterics of Hatteras Cove, nor any survey showing its contour and pth, I visited the locality September 2 and 3, 1910, and made a od reconnoissance of it, the results of which are shown on the companying map.[1] I have indicated on the map what appears to e to be the best design and location of a breakwater for the locality

[1] Not printed.

Digitized by Google

in view of the contour of the bottom, the shifting sands, the preva[illegible] winds, and storms. A heavier cross section has been adopted f[illegible] than that adopted for Cape Lookout on account of exposure to [illegible] which are higher and more prevalent at the latter place. T[illegible] designs are based on data hurridly obtained, and further inve[illegible] tions may disclose a more favorable location for the breakw[illegible] which would materially reduce its length.

The following are the characteristic features of the proposed br[illegible] waters at the two sites:

		Lookout.	Hat[illegible]
Available depth inside breakwater	feet	40	
Maximum depth of water in which constructed	do	43	
Length of breakwater from outer end to 30-foot contour	do	6,250	[illegible]
Length of breakwater from 30-foot contour to shore	do	800	[illegible]
Length of shore connection	do	1,600	
Stone required	tons	1,608,000	[illegible]
Unit price (including contingencies)		$2.20	[illegible]
Estimated cost		$3,526,600	$[illegible]
Inclosed area, 30 feet or more in depth	acres	575	

If the outer tangent of the proposed Hatteras breakwater be c[illegible] sidered too long, the estimate can be reduced at the rate of $61[illegible] linear foot decrease in its length. By making the angle between [illegible] inner and outer tangents somewhat smaller, the outer tangent [illegible] be reduced about 2,000 feet, providing a somewhat smaller har[illegible] costing $6,990,550, but this is not recommended. If the breakw[illegible] at Cape Lookout be estimated on the same profile and cost da[illegible] that at Cape Hatteras, its cost will be increased about $420,00[illegible] the figures above quoted are believed to be amply large. E[illegible] structure would have to be constructed from stone brought fr[illegible] distance, as there is no suitable stone found within 200 mil[illegible] either site. In the absence of rail transportation to either lo[illegible] it is assumed that all material would be brought by water. Su[illegible] harbors for small craft exist within reasonable distances of [illegible] localities, from which operations could be conducted, Bea[illegible] Harbor being only 8 miles distant from Cape Lookout and Hat[illegible] Inlet 10 miles from Cape Hatteras. If preferred, approach ca[illegible] had to both localities by water from the sounds in rear of the ca[illegible] A relatively small amount of dredging in Hatteras Slough, in Pa[illegible] Sound, would enable barges of 10 feet draft to reach the sound [illegible] of Hatteras beach in rear of the cape, whence a tramroad coul[illegible] used to convey the material to the cape. Barges of 10 feet [illegible] can now reach Shackleford Banks, in Beaufort Harbor, whe[illegible] similar tramroad could be used to convey material to Cape Look[illegible]

Summing up, Cape Hatteras is believed to be undeniably the [illegible] suitable place to locate a harbor of refuge on the coast of N[illegible] Carolina, the only tenable argument against the location being [illegible] it costs about 2.3 times as much as one at Cape Lookout would cost. [illegible] it would be nearly three times as large outside the 30-foot con[illegible] The reason for this difference of area is that in providing a harb[illegible] refuge for "deep-draft" vessels a depth of 40 feet for their anchor[illegible] was considered none too small, in view of the plunge that is ca[illegible] by heavy waves entering the harbor, and to obtain that depth in[illegible] the proposed breakwater at Hatteras was necessary to place it [illegible] out from shore. Whether the slight advantage in desirability [illegible]

Digitized by Google

unterbalance the enormous difference of cost is the problem that ust be determined.

The two localities are but 75 miles apart, which, in a nautical sense, very small. The opinions of agents of vessels and seafaring men e quite evenly divided in designating one of the two as preferable the other. The difference in value of a harbor at the two locali- s is so small that if the proposed harbor at Cape Lookout were eady in existence and the proposition were made to construct an ditional harbor at Cape Hatteras at the difference of cost of the o as estimated above it would undoubtedly be rejected. Should be determined that a different location or a different size of break- ter and shape of harbor would be practicable so as to reduce the st of a harbor at Hatteras, a survey of Hatteras Cove to obtain the ditional information should be made, which would cost about 500. It is recommended that such a survey be made in order that re exact plans and estimates may be prepared.

Very respectfully,

EARL I. BROWN,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., December 17, 1910.

Respectfully forwarded to the Chief of Engineers, United States ny.

The law and the orders in this matter appear to have been com- d with by the district officer. He discusses two harbors—one at e Lookout and one at Cape Hatteras. They are very much alike neither of them is suitable for a harbor of refuge.

The expensive work that it is necessary to build at each of these ces is designed to protect an area from wind and seas coming from east and south, and vessels which happen to be to the north of se harbors when storms were prevailing from these directions would tterly unable to reach the harbors at all and, indeed, if they could ke headway against the storm it would be better for them, after y reached the outer limit of the long sand spit, to keep on out to and maintain the good offing which they had gained.

The Cape Lookout Harbor is cheaper and smaller than the Cape teras, but a harbor of refuge that doesn't accomplish what it is nded to accomplish is dear at any price. My opinion is that both hese localities will have to be rejected. The place to look for a oor is about 8 or 10 miles north of Hatteras, along the straight re, and if a harbor is needed it must be built there, must be sur- nded by an enormous breakwater, well out to sea, must have good ances both from the north and south, and must afford sufficient and suitable holding ground.

With the constant improvement in strength and seaworthiness of mercial vessels, I am inclined to think that harbors of refuge solely becoming of less importance every year.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

Digitized by Google

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 8, 191

Respectfully returned to the Chief of Engineers, United St Army, inviting attention to the board's report of this date cover this subject and the preliminary examination of Cape Lookout w a view to determining its availability and adaptability as a comm cial harbor. (See p. 10.)

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board

PRELIMINARY EXAMINATION OF CAPE LOOKOUT, N. C., WITH A V TO THE CONSTRUCTION OF A COMMERCIAL HARBOR.

UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., December 12, 19

SIR: I have the honor to submit the following report of Cape L out Harbor, N. C., made pursuant to the provisions of the river harbor act approved June 25, 1910, having in view the determin of its availability and adaptability as a commercial harbor.

The duty of making this report was assigned to me by depart letter dated August 4, 1910.

This harbor has already been made the subject of several re as to its suitability as a harbor of refuge, one of the latest being published in House Document No. 315, Sixty-first Congress, s session, to which attention is invited for a description of its phy characteristics.

The term "harbor" is used to denote places where ships may security and protection from the winds and storms encounter sea. The harbor may or may not have wharves, piers, and term where vessels may lie and load or discharge freight. If such fac are provided, the harbor is termed a commercial harbor. If facilities are not provided, and the vessel simply lies at anchor a ing favorable weather for proceeding on her voyage, the harbor harbor of refuge.

To justify the construction of the wharves, piers, terminals, mechanical appliances for loading and discharging freight, there be a point or points from which commodities are brought to the mercial harbor for being loaded onto the ships, or to which modities brought by the vessels are destined to be transported, or the harbor must itself be located at the point producing the ar for shipment or consuming those shipped. In the first case the mercial harbor is merely a point, provided with suitable faci where the mode of transportation is changed from one class t other. One class of transportation being by rail or smaller ve and the other being by large vessels. Commercial harbors of class do not require to be adjacent to large centers of population may be in comparatively unpopulated places; they must be conn by coordinate means of transportation with such thickly popu centers or with regions producing large quantities of raw mat such as iron and other ores, coal, etc.

Digitized by Google

The other class of commercial harbor, that is, the one located at he point producing or consuming the articles transported by vessel, ıust be located either at a thickly populated or manufacturing enter or else adjacent to a mine or other producer of bulky freight.

As Cape Lookout Harbor is located on a narrow sand spit pro-ecting into the Atlantic Ocean and is separated from the mainland y a body of water 1 to 2 miles wide, as the density of population ontiguous thereto is exceedingly small, and as there are no mines or manufacturing establishments of any account anywhere near it, ; could only become a commercial harbor of the class where freight ı transferred from one means of transportation to another.

There are at present no coordinate lines of transportation reaching his harbor; therefore until such lines are established it can not ecome a commercial harbor.

Even though such lines were established and were bringing com-ıodities to be transferred to vessels, the physical conditions at this arbor are not yet perfect enough to constitute it a good commercial arbor, because it is yet exposed to the winds and waves of the south-'est storms, which are quite prevalent on the southern Atlantic oast, especially during the summer and early fall months. To dapt the harbor, therefore, to use as a commercial harbor, the con-truction of some class of expensive protection on the western side 'ould be required. If once adapted, by such a protection, to com-ıercial use, it would then have to be rendered available by the provi-ion of some coordinate transportation line extending inland to the enters of population.

After all these means were adopted to render the harbor adapted nd available for commercial use, trade would in the long run seek hat port nearest to its point of origin or demand, and that territory 'hich could most easily and cheaply trade through this harbor would robably use it.

If on the map lines be drawn from Cape Lookout to Norfolk, on he north, and to the mouth of Cape Fear River, on the south, the wo nearest maritime ports, and perpendiculars be erected on these nes at their middle points, it will be seen that the perpendiculars 'ill intersect somewhere near Raleigh, N. C., and all the remainder f the State outside that narrow sector between these lines will be seen ɔ be nearer either to Norfolk or to Wilmington than to Cape Look-ut, and therefore naturally tributary to one of those places rather than ɔ Cape Lookout. A further examination of the map will reveal hat all the principal centers of population are already connected 'ith the two ports just named by the two principal railroad systems f this section, the Atlantic Coast Line Railroad and the Seaboard .ir Line Railway, and that the only railroad system that would find it t all practicable to reach this harbor is a minor system, the Norfolk outhern Railroad, which already has deep-water terminals at Nor-ɔlk, Va., and at Morehead City, N. C., on Beaufort Harbor.

Cape Lookout, therefore, is neither available nor adapted in its resent condition for the establishment of a commercial harbor.

If, however, this locality should be improved as a harbor of refuge, ɔme commercial use could and probably would be made of it. Such se, however, would probably be very small, and would probably be ı the nature of furnishing supplies, such as provisions and coal, for uch vessels as might take refuge there or using it as a port of call.

Digitized by Google

There are no terminal facilities whatever at this locality now, a none needed, neither are there any questions of water power, or o related subjects to be considered in connection with the propo improvement.

Respectfully submitted.

EARL I. BROWN,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER,
SOUTHEAST DIVISION,
Savannah, Ga., December 17, 1910

Respectfully forwarded to the Chief of Engineers, United Sta Army.

I fully agree with the district officer as to the unsuitability of Ca Lookout as a commercial harbor.

The land approaches to any commercial harbor are matters prime importance. They must be ample, easy of maintenance, a above all things, short. It is desirable that the ship shall be bro as near the point of origin of the freight as possible, since water tra portation by large vessels is much cheaper than rail transporta Even if good rail routes existed out to Cape Lookout, the port c not compete with Norfolk, Wilmington, Charleston, or Savann on account of the greater length of the land routes.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARI ON CAPE LOOKOUT, N. C., WITH A VIEW TO THE CONSTRUCTION A HARBOR OF REFUGE AND A COMMERCIAL HARBOR.

WAR DEPARTMENT,
THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 8, 191

SIR: The board has the honor to submit its report in respons the following concurrent resolution of the Sixty-first Congress of United States, passed February 21, 1910:

Resolved by the Senate (the House of Representatives concurring), That the Sec of War is hereby authorized and directed to cause a further and supplemental ination to be made of Cape Lookout, North Carolina, provided for in the river harbor act of March third, nineteen hundred and nine, with a view to determ its relative advantage and value as a site for a harbor of refuge for coastwise and draft vessels as compared with other localities on the coast of North Carolina, esp the harbors of Beaufort, Southport or Cape Fear, and Cape Hatteras, and to s the results of such examination, together with estimates of cost, to Congress at the ea date practicable.

The board is also required under the river and harbor act of J 25, 1910, to report upon "Cape Lookout Harbor with a view to d mining its availability and adaptability as a commercial harb The questions involved in a study of the merits of a harbor of re and of a commercial harbor at this locality are so interrelated t it is proposed to cover both subjects in one report.

Digitized by Google

The preliminary investigation as to the best location for a harbor of refuge on the coast of North Carolina led to the conclusion that the choice lay between Cape Lookout and Cape Hatteras. Estimates of cost have been prepared by the district officer for such improvement as seemed necessary to fit the respective harbors for the purpose intended. From a study of the two localities it appears that both capes furnish partial protection in their present condition, but that extensive breakwaters would be required at either place to give complete protection to deep-draft vessels. Both have good holding ground. The shifting character of the sands is more pronounced at Hatteras than at Cape Lookout. Physical conditions necessitate a more extensive and larger structure at Hatteras, but this would afford a relatively larger protected area. Hatteras is more remote from railroad facilities and more difficult of access by water, and construction there would be more costly. Connection by rail or water with a commercial center where supplies and repairs could be obtained is impracticable at Hatteras, while at Lookout communication can now be had with Beaufort and Morehead City by light-draft vessels, and conditions are such that railroad extension to the harbor is possible.

A table compiled by the district officer gives the following characteristic features of the two harbors:

		Lookout.	Hatteras.
Available depth inside breakwater	feet	40	42
Maximum depth of water in which constructed	do	43	43
Length of breakwater from outer end to 30-foot contour	do	6,250	12,000
Length of breakwater from 30-foot contour to shore	do	800	7,100
Length of shore connection	do	1,600	5,000
Stone required	tons	1,003,000	3,284,220
Unit price (including contingencies)		$2.20	$2.50
Estimated cost		$3,536,600	$8,210,550
Inclosed area 30 feet or more in depth	acres	575	1,500

From this table it will be seen that the cost of a harbor at Hatteras would be about 2.3 times as much as one at Cape Lookout. The district officer states that in his opinion Cape Hatteras is the most suitable locality for a harbor of refuge on the coast of North Carolina, but refers to its great cost as compared with a harbor at Lookout, and states that whether the slight advantage in desirability will counterbalance the enormous difference in cost is the problem that must be determined. The division engineer does not believe that a harbor of refuge should be established at either locality.

The two vital questions in determining the advisability of a harbor of refuge are, first, the necessity for such a harbor, and, second, the choice of location. Special efforts have been made by the board to solve these questions. It issued circular letters to all the principal navigation and trade associations, coastwise steamship lines, vessel owners, etc., between Boston and New Orleans, requesting their views as to the best location for a harbor of refuge on the coast of North Carolina, made an inspection of Cape Hatteras and vicinity on October 11, 1911, of Cape Lookout on November 7, 1911, and on the latter date held a duly advertised hearing in the town of Beaufort, N. C., which was attended by a large number of interested persons, including representatives of maritime interests from Boston and New York, who were delegated to appear before the board in connection with this

Digitized by Google

matter. It appears from data in hand that of 226 masters of v-
190, or 84 per cent, advocate Cape Lookout in preference to Cap-
teras, and that maritime interests other than shipmasters are
tically unanimous in favor of Cape Lookout. A representative
steamship companies, involving practically all the south At.
coastwise steamship business, appeared before the board in fav
Cape Lookout. In addition, boards of trade, chambers of com.
maritime exchanges, boards of underwriters, insurance comp
and others interested in the general commerce of the country,
particularly in the maritime commerce, to the number of 45 ar
record as favoring Lookout. Expressions of opinion favoring Ha
are practically confined to a few individual masters of vessels.

In reference to the necessity for a harbor of refuge, it ap
from data submitted that 139 vessels of all classes were in
in disasters on the North Carolina coast during the ten years e
1908, and from a table compiled from data furnished by the
Saving Service covering this same period it appears that of t
139 vessels 82 were total losses, that the property loss amount
$3,984,780, and that 88 lives were lost. Communications
practically all the insurance companies engaged in underw
marine risks along the Atlantic coast, the Maritime Exchan
New York, the Philadelphia Maritime Exchange, the Merritt-C
man Derrick & Wrecking Co., the National Board of M
Underwriters, and the American Steamship Association are o
bearing testimony as to the necessity for a harbor of refuge o
coast of North Carolina. It is evident that these interests
deeply concerned in this question and that the consensus of op
is in favor of Cape Lookout for such a harbor.

Considering the question from the viewpoint of a comm
harbor, it appears from the report of the district officer that t
are no large centers of trade in the section of country tributa
this harbor, and there are no large manufacturing, mining or
cantile industries which create a large commerce naturally trib
to it. To fit the harbor for commercial purposes would requi
construction of an extensive breakwater protection similar to
needed for a harbor of refuge, involving several million d
which would be clearly unwarranted by existing and reas
prospective commerce. In view of these facts both the di
officer and the division engineer report adversely on the imp
ment of Cape Lookout Harbor with a view to its availability
adaptability as a commercial harbor.

The board concurs with the district officer and the division en
in the opinion that the construction of a harbor at Cape L
for commercial purposes alone is not warranted, but it be
that the establishment of a harbor of refuge is advisable, and
such a harbor in this locality would naturally lead to some comm
development that would add to the value of the improvement.

The estimated cost of a breakwater to form a harbor of ref
Cape Lookout, as given by the district officer, is $3,526,600.
estimate is based upon surveys made in 1897 and 1899, and
deemed sufficient for present purposes, it is probable that actual
veys and further study regarding location, type, and dimension
breakwater, which should be given, will somewhat alter these fi
Owing to the shifting character of the material on which the b

Digitized by Google

ter would be built, it does not seem necessary or advisable to ke further surveys or studies for the determination of the exact t and type of the breakwater until the work has been authorized l the funds are available, as these figures would always be subject some change.

.n conclusion, the board reports that in its opinion it is advisable the General Government to establish a harbor of refuge at Cape okout, N. C., at an approximate cost of $3,526,600, with the underanding, however, that further study will be given to the engineering tures of the project before actual work is commenced. It is ommended that the sum of $500,000 be made available in the first opriation, and that contract authorization be given for the ance with a view to completing the work in four years.

In compliance with law, the board reports that there are no quesns of water power, terminal facilities, or other related subjects ich could be advantageously coordinated with the recommended provement to lessen its cost and compensate the Government for penditures made in the interests of navigation.

For the board:

Very respectfully, WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

TATEMENT OF MASTERS OF SHIPS ENGAGED IN COMMERCE ALONG THE ATLANTIC SEABOARD.

IRS: We, the undersigned masters of ships, engaged in commerce along the Atlantic board, consider the establishment and proper location of a harbor of refuge at e point on the Carolina coast, a matter of such vital importance to us, that we ht, in view of the present situation, give expression of the conditions which conit those engaged in navigating the most dangerous coast on the Atlantic seaboard. he statistics of the Life-Saving Service in the Treasury Department show that ing the 10 years from July 1, 1898, to July 1, 1908, 139 vessels of all classes were olved in disaster on the North Carolina coast. Anything which will tend to nimize the danger of this important branch of transportation is worthy of the best ught that those engaged in the business can give, and we deem it not improper for at this time, to set forth in a memorial, what we consider the essential requisites harbor of refuge, and which place on the Carolina coast will come nearest meeting se requirements.

he essential requisites of a harbor of refuge, in our opinion, are:

irst. Good and safe anchorage, protected from heavy seas and winds.

econd. Ease and safety of approach at all times.

hird. Proximity to line of travel, and possible chance of reaching the harbor of ge in safety after the trouble first begins.

. What are the conditions that would surround a harbor of refuge located at Cape tteras?

a) The harbor would be located on the southern side of the Cape, and according the proposed plan the breakwater would extend out 18,000 feet, affording an achor of 1,500 acres or thereabouts, with good holding ground inside the harbor.

b) Owing to the peculiar formation of Hatteras and the sea bottom in its immediate inity, the approach to a harbor of refuge at that point would be dangerous. Cape tteras and the Diamond Shoals are probably the most dangerous points so far as igators are concerned on the Atlantic coast. The shoals extend out almost to the e of the Gulf Stream, and this makes a peculiar climatic condition, the result of ich is a great deal of thick, heavy weather, accompanied by rain and fogs.

The sea bottom does not shelve regularly, but there are many places which carry d soundings to a point where the water shoals rapidly, not only ahead, but on both ws.

Digitized by Google

Owing to the character of the weather which is frequently encountered at a around Cape Hatteras, it is often impossible for navigators to obtain observations a they must then rely upon dead reckoning and soundings. As long as the weath fair and observations can be regularly taken, few vessels depend upon dead reckon or soundings for their location, but when the weather becomes thick and heavy, a observations cannot be had, then they must, in approaching a shore, especially a shore, depend largely upon their soundings. Owing to the nature of the sea bot in and around the Diamond Shoals, the soundings are very treacherous and unrelia

(c) Cape Hatteras is probably nearer the line of travel for more vessels than a other point on the coast.

If the vessel be north of the cape when the trouble first begins, then in order for vessel to reach the harbor of refuge she must double Diamond Shoal lightship a seek a harbor of refuge on the southern side of the cape, in the very close proxim to a very dangerous shoal.

II. Cape Lookout:

(a) A harbor of refuge located at Cape Lookout would, like the one at Cape Hatte be located on the southern side of the cape. With a breakwater extending out 1 feet, the same distance as the one suggested for Cape Hatteras, the anchorage w be larger than the suggested harbor at Hatteras, with good holding ground on inside of the harbor.

(b) Ease and safety of approach.

Lookout shoals are farther from the Gulf Stream than the shoals at Hatteras a the climatic conditions do not bring about as much thick heavy weather, accompan so frequently by rain and fog. Therefore, observations are easier made and lightship can be more readily observed.

The sea bottom from the inner edge of the Gulf Stream shoals gradually and comparatively level and soundings are very regular, which makes the harbor of ref safe and easier to approach than the proposed harbor of refuge at Cape Hatteras

The conditions of the sea bottom in and around Cape Lookout are exactly opposite to those in and around Hatteras; the former is comparatively level shoals gradually; the latter is rough, uneven, full of valleys and shoals and there dangerous.

Cape Lookout is somewhat farther from the usual line of travel for vessels, but distance is not great enough to be a factor.

It is urged that more vessels are involved in disaster at and north of Hatteras th anywhere else along the Carolina shore, and that this conclusively demonstrates t the proper location of this harbor of refuge should be at Cape Hatteras.

As practical seamen, we beg leave to dissent from this proposition:

Of the 139 vessels involved in disaster in 10 years preceding July 1, 1908, 111 w stranded, 3 had machinery disabled, 6 were burned, 3 foundered, 7 had hull, mast rigging injured, 2 struck wrecks, 2 were water logged, 2 capsized, 3 had cargo damag

Of the 139 involved, 32 of these accidents were north of Hatteras, and of this at least 98 per cent resulted in their vessels being stranded.

The statistics at hand do not show where these vessels were when the trouble f began, only that they went ashore north of Hatteras. Assuming that the trou began after they passed Hatteras, then they could not have reached a harbor refuge south of Cape Hatteras.

Twenty-eight vessels were involved in disaster at Cape Hatteras, 9 of these, or a thir were stranded on the Diamond Shoals, and about 15 others were stranded at the cap These vessels were all driven ashore while probably trying to reach Hampton Roa in the face of an easterly gale.

With a harbor of refuge at Lookout they could have turned tail and run down t coast, passing Lookout lightship and headed into the bight at Lookout.

We have deemed it wise in presenting this memorial to set forth facts as to each the above locations and that each sailing master should then express his individ opinion by writing opposite his name the location that he deems will best serve t shipping interests.

(This statement signed by 193 persons favoring Cape Lookout, 6 persons favor a point south of Hatteras, 1 person favoring either Cape Lookout or Cape Hatteras, persons favoring Cape Hatteras, and 1 person favoring neither locality.)

To the BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

LETTER OF MR. IRA M. TAPLEY.

SIRS: Your honorable board, at the meeting held at Beaufort on the 7th day of November, 1911, on the question of establishing a harbor of refuge on the Carolina coast, having courteously given the undersigned time within which to submit to the board additional data on this very important subject, the undersigned in presenting these data feels that it is not inappropriate for him on behalf of those interested to make and submit to the board for convenient reference a brief summary of the data which have been gathered.

The subject naturally divides itself into two parts:

First. Is there necessity for a harbor of refuge on the Carolina coast?

A careful examination of the natural conditions existing along the Carolina coast conclusively shows that a harbor of refuge would certainly be of very great advantage to the maritime interest, not only of the United States but to vessels under foreign flags engaged in commerce along the South Atlantic coast, Gulf of Mexico, and the island of Cuba; and we may say that it would be not only a great advantage, but has now or will shortly become a matter of great necessity.

Along the Atlantic coast from the mouth of Cape Fear River to Cape Henry, a distance of 258 miles, there is no harbor which is accessible to vessels of any size, yet within this distance we find Frying Pan Shoals, Cape Lookout, and Cape Hatteras all constituting greater or less menace to the maritime interests operating on the South Atlantic coast.

On the Carolina coast, during the period of 10 years from July 1, 1898, to July 1, 1908, 139 vessels have been involved in disaster.

From the formation of the coast it can not be doubted that had there existed a harbor of refuge within this territory, many of the vessels would have sought it and escaped. While statistics are not available to show the number of vessels in the list of those lost which were seeking harbor, those who are familiar with navigation can not doubt that a large proportion would have escaped if a suitable harbor had existed on the Carolina coast.

As evidence of the great interest which those engaged in the commerce of the country take in this question, and as showing their views, we respectfully refer the board to the following data, now presented, together with that already before you.

All of the insurance companies engaged in underwriting marine risks along the Atlantic coast by petition advise this honorable board that they consider—

"That the establishment of a harbor of refuge at some point on the Carolina coast is a matter of vital importance to shipowners and shipping interests."

The Maritime Exchange of New York, representing all shipowners, including sail, steam, and barges hailing from that port, speaking through its board, advise this honorable board that:

"We believe that the establishment of such a harbor of refuge to be most necessary and urgent."

And point your honorable board to the reasons which prompt them to this opinion, in this language:

"The large number of vessels involved in disaster on the North Carolina coast each year, the consequent loss of life, largely due to vessels being unable to find a harbor in this vicinity, emphasizes the need of such a harbor for all classes of vessels."

The Philadelphia Maritime Exchange places itself on record by letter under the hand of its president and attested by its secretary, with its corporate seal affixed, and advises your honorable board that—

"This exchange is very strongly of the opinion that a national harbor of refuge on the North Carolina coast is an urgent necessity."

The Merritt & Chapman Derrick & Wrecking Co., after long experience as salvors along the Atlantic coast, certify to your honorable board, that in the opinion of that company, based upon their long experience, "such a harbor is necessary."

The National Board of Marine Underwriters and the Board of Marine Underwriters of New York join the other maritime interest in expressing their opinion as to the urgent necessity of such a harbor, and give their reasons therefor.

Feeling the urgent necessity of such a harbor, and not content with a petition, a number of shipowners, representing the sailing shipowners of New York, Boston, Portland, and Bath, Me., the Coastwise Transportation Co., and the Boston Chamber of Commerce sent their duly accredited representative, Capt. J. G. Crowley, to appear in person before your honorable board and present their views on this, to them, probably one of the most important questions before the country.

The American Steamship Association has been pleased to accredit the undersigned to speak for them and to present their views.

Digitized by Google

In addition to this there has been filed with this honorable board petitions of al masters, evidencing their desire for this, to them, almost priceless boon, a "harbor refuge."

Thus we see that practically every maritime interest on the Atlantic seaboa joins in the opinion that a harbor of refuge at some point on the North Carolina co is a matter of urgent necessity.

That the United States Government has only recently completed the Cour-Sou Canal, which connects Pamlico Sound with Beaufort Inlet. The completion of t Cape Cod Canal and the improvement of the Chesapeake & Albemarle Canal c necting the Elizabeth River with Albemarle Sound will make an inland waterw from Boston to Beaufort, N. C., which will be very generally used by tows and vess of light draft.

The approach of this inland waterway is a narrow channel, and owing to the chara of the bottom is constantly subject to change. In stormy weather, attended t high seas, the entrance to this canal would be impracticable, and unless a harbor refuge were near at hand vessels or tows approaching this inland waterway w be in grave peril.

Second: Where should the proposed harbor of refuge be located?

Two places have been called to the attention of the board as being suitable f harbor of refuge, Cape Hatteras and Cape Lookout.

Those interested in this matter have attempted to gather data as to which is better location.

Masters of vessels have filed petitions with this honorable board, and all of th save 36 advocate Cape Lookout as the better location, that is, 190 masters advoc Cape Lookout and 36 advocate Cape Hatteras.

The maritime interest, other than the shipmasters, is unanimous in favor c location at Cape Lookout.

The American Steamship Association, speaking through its duly accredited re sentative, advocates Cape Lookout. The steamship companies composing association are as follows: American Hawaiian Steamship Co., Boston & Philade Steamship Co., Baltimore Steam Packet Co., Chesapeake Steamship Co., C Steamship Co., Eastern Steamship Co., Joy Steamship Co., Maine Steamship Massachusetts Steamship Co., Merchants & Miners Transportation Co., Metrop Steamship Co., New England Navigation Co., New York & Baltimore Transport Co., New York & Cuba Mail Steamship Co., New York & Porto Rico Steamship Norfolk & Washington Steamship Co., Ocean Steamship Co., Old Dominion Stean Co., Peninsula & Occidental Steamship Co., Red D Line, Southern Pacific Southern Steamship Co.

Sailing-ship owners, speaking through their accredited representative, Capt. J Crowley, advocate Cape Lookout, the owners being as follows: M. P. Smith & Co., John A. Elliott & Co., William Swan, C. W. Crane, C. W. Chadwick, F. Jones, W. E. Crockett, H. A. Bailey, H. P. Havens, J. F. Whitney, Scannell B J. H. Winchester, Miller & Houghton, New York; John S. Emery & Co., Crow Thurlow, Rogers & Webb, Bliss & Co., Boston, Mass.; J. S. Winslow, Portland, M Percy & Small, Deering Bath, Me.

Those named below, who are largely interested in the commerce of this cou especially maritime commerce, either by petition, letters, or through their accredited representative, advocate Cape Lookout as the better location, t Board of Underwriters of New York, National Board of Marine Underwriters, P delphia Maritime Exchange, Maritime Exchange of the Port of New York, M & Chapman Derrick & Wrecking Co. (the salvors of the Atlantic coast), B Chamber of Commerce.

The following insurance companies, being companies engaged in underwr marine risks along the Atlantic seaboard, to wit: Board of Underwriters of New Y Atlantic Mutual Insurance Co., Federal Insurance Co., Sea Insurance Co. (L Marine Insurance Co. (Ltd.), London Assurance (Marine), Columbia Insurance Fireman's Fund Insurance Co., Mannheim Insurance Co., Union Marine Insur Co. (Ltd.), St. Paul Fire & Marine Insurance Co., Providence Washington Insurance Home Insurance Co., United States "Lloyds," Indemnity Mutual Marine Assur Co. (Ltd.), of London, Royal Exchange Assurance Co., Boston Insurance Co., W Assurance Co. of Toronto, Liverpool & London & Globe Insurance Co. (Ltd.), Tha & Mersey Marine Insurance Co., Allianz Insurance Co. (Ltd.), General Marine I ance Co. of Dresden, Switzerland General Insurance Co., of Zurich, Royal Insura Co. (Ltd.), Queen Insurance Co. of America, Ætna Insurance Co., Transporta Mutual Insurance Co., British & Foreign Marine Insurance Co. (Ltd.), Re Marine Insurance Co. (Ltd.), Ocean Marine Insurance Co., Boston Insurance American and Foreign Marine Insurance Co., Insurance Co. of North America, Al Insurance Co. of Philadelphia, Union Insurance Co., Merchants Insurance Co.

Digitized by Google

The following insurance brokers: Johnson & Higgins, Frank & Dubois, Wilcox, Peck & Hughs, Mather & Co., Billington, Hutchison & Co., L. A. Wright & Co., Pate & Kobb.

Respectfully submitted.

IRA M. TAPLEY.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

PETITION OF INSURANCE BROKERS AND COMPANIES ENGAGED IN INSURING AND UNDERWRITING VESSELS PLYING THE ATLANTIC SEABOARD.

SIRS: We, the undersigned insurance brokers, engaged in placing marine insurance risks on vessels and cargoes along the Atlantic seaboard, are advised that the Government of the United States consider that the establishment of a harbor or refuge at some point on the North Carolina coast is a matter of vital importance to shipowners and shipping interests.

We also understand that the board of Army engineers has been authorized to determine the most desirable locality upon the North Carolina coast for such a refuge.

We also understand that the above board of engineers has considered two places: Cape Lookout and Cape Hatteras, and the board which is deputed to consider this matter convene some time in November at Beaufort, N. C.

This matter has been brought to our attention by the American Steamship Owners Association, who are presenting a petition which gives the signer the option of expressing his views as to which of the two locations mentioned, either Lookout or Hatteras, is in his mind the more preferable of the two. We have read this petition, and the conditions presented indicate that Lookout is the far more preferable of the two locations as a harbor of refuge, both for steamers and sailing vessels and barges; and in affixing our signatures hereto we desire to express our hearty approval of the petition which we have mentioned, and of the choice of Cape Lookout as the proper location of the harbor of refuge.

Signed by 7 insurance brokers. Similar petition signed by 36 insurance companies.

To the BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. I. M. TAPLEY.

NORFOLK, VA., *January 2, 1912.*

GENTLEMEN: I am sending you to-day under special cover a copy of the log[1] of the lightship at Cape Lookout; also copy of the log[1] of the lightship at Cape Hatteras, properly attested by the Secretary of Commerce and Labor, showing the weather conditions at these respective light vessels for the year 1910.

A summary of these logs shows that Diamond Shoal light vessel during the year 1910 had a total of 112 days of rain, haze, snow, vapor, and fog. The records of the Cape Lookout light vessel for the year 1910 show a total of 57 days of snow, rain, haze, fog, and vapor, showing that at Hatteras Shoal there were 55 days more of rain, haze, snow, fog, and vapor than at Cape Lookout.

This is in line with the argument in the masters' petitions with which I furnished your board at the Cape Lookout meeting on the question of a harbor of refuge on the North Carolina coast, on November 27, at Beaufort, N. C. This is also in line with the memorials and resolutions from the underwriters, boards of trade, and maritime exchanges which I filed with you on November 10.

This is for your information.

Very respectfully, yours,

I. M. TAPLEY.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

---

[1] Only the summary of the logs is printed.

Digitized by Google

Number days rain, haze, snow, vapor, and fog at Diamond Shoals, from Jan. 1, 191-. Jan. 1, 1911.

	Lightship—			Lightship—	
	No. 71.	No. 72.		No. 71.	No. 7
January	11	.....	September	5	.....
February	4	4	October	8	.....
March	.....	14	November	5	.....
April	.....	10	December	10	.....
May	.....	4			
June	.....	7	Total	43	
July	.....	10	Grand total	.....	
August	.....	20			

Number of days rain, haze, snow, vapor, and fog at Cape Lookout, from Jan. 1, 191-. Jan. 1, 1911.

	Lightship No. 80.		Light No.
January	4	August	
February	6	September	.....
March	5	October	
April	10	November	
May	5	December	
June	8		
July	8	Total	

LETTER OF MESSRS. COHEN & WELLS.

CHARLESTON, S. C., *April 13, 191-*

GENTLEMEN: In reply to your circular of April 11, we have consulted the mas of coastwise vessels trading past Cape Hatteras. They are unanimously of the opi if it is practicable to build a harbor of refuge at Hatteras Bight, it would be the place, but failing in that, they think that such a harbor at Cape Lookout woul preferable to any other point on the North Carolina coast. The nearer to Hatte a harbor of refuge is built it would be better for shipping. As you are aware Look Bight is at present a natural harbor of refuge, but it can be improved upon.

Yours respectfully,

COHEN & WELLS

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. HENRY LORD.

BANGOR, ME., *June 14, 191-*

DEAR SIR: Referring to your letter of April 11, which came while I was on the Pa coast, would say that I inclose herewith a letter from Capt. George A. Erskine, ma of schooner *Emma S. Lord*, which gives the opinion of an intelligent, practical m in regard to a harbor of refuge near Cape Lookout. Other captains with whom I h talked express a similar opinion.

Yours, truly,

HENRY LORD

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

LETTER OF MR. G. A. ERSKINE.

BUCKSPORT, ME., *June 10, 1910.*

DEAR SIR: Replying to your questions relating to the most desirable and advantageous point on our southern coast south of Cape Hatteras for a harbor of refuge for deep-draft vessels, will say, having been master of vessels trading south of Cape Hatteras a greater part of the time for the past 15 years, that in my opinion Cape Lookout Cove would be the most feasible and desirable location to build such a harbor for several reasons.

First. Because a harbor can be constructed there at less expense than any other point near Cape Hatteras.

Second. Being near Moorhead City and railroad connection, supplies can be easily obtained for vessels in need or in distress.

Cape Lookout Cove to-day is protected from all winds from north-northwest to south via the east and open to all westerly winds, good holding ground, 5 to 10 fathoms water, no obstructions to harbor from western side, but Cape Lookout Shoals extend away to the south a long distance, and are very dangerous to navigation. Cape Fear and off Southport the ground is not good for holding and could not compare with Lookout Cove. A harbor could be constructed at Cape Hatteras Cove, but would not be much used.

I remain, yours, respectfully,

G. A. ERSKINE,
Master Schooner Emma S. Lord.

Mr. HENRY LORD, *Bangor, Me.*

LETTER OF MR. M. M. CROCKETT.

NEW YORK, *October 30, 1911.*

SIR: In reference to the proposed breakwater at Cape Hatteras or Lookout; in my opinion Cape Lookout is by far the better site, as it affords a safer and better anchorage, and will be much easier of approach in thick weather.

A breakwater at Cape Hatteras would afford very little if any protection in very heavy south and southeast gales, and will be more difficult of approach in thick weather than the Cape Lookout anchorage. I am also of the opinion that the heavy southerly sea would wash the sand around the breakwater in such quantities as to shoal the anchorage and make dredging necessary.

Respectfully,

M. M. CROCKETT.

Mr. A. A. RAVEN.

LETTER OF THE PHILADELPHIA MARITIME EXCHANGE.

PHILADELPHIA, PA., *November 4, 1911.*

GENTLEMEN: Being advised that your honorable board contemplates holding a public hearing at Beaufort, N. C., on November 7, to hear parties interested in the proposed work at Cape Lookout, N. C., as a harbor of refuge, the Philadelphia Maritime Exchange desires to place itself on record as favoring a very thorough investigation to emphasize the views of those interests most vitally affected in connection therewith, notably the sailing vessel and barge owners and masters, marine insurance interests, etc.

This exchange is very strongly of opinion that a national harbor of refuge on the North Carolina coast is an urgent necessity, and after a careful consideration of the subject favors its location at Cape Lookout. The earnest effort and progress that is being made in the direction of an intracoastal waterway along the Atlantic coast with its connection at Beaufort would seem to us to be a strong argument for a choice of this locality.

All of which is respectfully submitted.

The PHILADELPHIA MARITIME EXCHANGE,
By J. S. W. HOLTON, *President.*

Attest:
C. L. SHARWOOD, *Secretary.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

LETTER OF THE MARITIME ASSOCIATION OF THE PORT OF NEW YORK.

MARITIME EXCHANGE,
New York, November 13, 1911

GENTLEMEN: The board of directors of the Maritime Association of the Port of New York have been advised that the United States Government is contemplating the establishment of a port of refuge on the North Carolina Coast. We, therefore, desire to state that we believe the establishment of such a harbor of refuge to be most necessary and urgent.

The large number of vessels involved in disaster on the North Carolina coast each year, and the consequent loss of life largely due to vessels being unable to find a harbor in this vicinity, emphasizes the need of such a harbor for all classes of vessels.

We, therefore, urge that your honorable board report favorably on the establishment of a harbor of refuge on the North Carolina coast, and that you recommend a suitable appropriation by Congress for this purpose.

Very respectfully,

WILLARD U. TAYLOR,
President.

WM. SIMMONS,
Secretary.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MERRITT & CHAPMAN DERRICK & WRECKING CO.

November 14, 1911

SIRS: The Merritt & Chapman Wrecking Co., having had brought to our attention the fact that the United States Government is contemplating the necessity of establishing a harbor of refuge on the coast of North Carolina, and that Congress has referred the matter to you as to the necessity and proper location of such a harbor, we, the undersigned, by reason of our long experience as salvors along the North Atlantic coast, wish to express our opinion that such a harbor is necessary and that Cape Lookout bight offers a very much better location than Hatteras in that the soundings are more regular and, therefore, the approach less dangerous than at Hatteras. We further wish to express the opinion that by reason of the character of the bottom in and around Cape Hatteras a harbor of refuge would be expensive to establish and difficult to maintain, whereas Lookout is a natural harbor and a harbor of refuge could be built at very much less cost than at Cape Hatteras, and that the cost of maintaining the harbor would be nominal.

Very respectfully,

MERRITT & CHAPMAN DERRICK & WRECKING CO.
ISRAEL J. MERRITT, *President.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE BOARD OF UNDERWRITERS OF NEW YORK.

NEW YORK, *November 15, 1911*

DEAR SIRS: The question has been brought to the New York Board of Marine Underwriters regarding the necessity of establishing a port of refuge on the coast of North Carolina, and we notice that Congress has referred to your board the question of necessity for and proper location of such harbor.

This board is deeply interested in all matters pertaining to the protection of shipping at sea and therefore we beg to ask your attention to the following: The statistics of the Life-Saving Service of the Treasury Department show that during the 20 years preceding 1910, 2,250 lives were lost on the North Atlantic coast. These statistics also show that from the 1st of July, 1898, to the 1st of July, 1908, 139 vessels of all classes were involved in disaster on the North Carolina coast. Of these 139 vessels, 1 were stranded; 3 had machinery disabled; 6 were burned; 3 foundered; 7 had hulls, masts, or rigging seriously damaged; 2 struck wrecks; 2 capsized; and 3 had cargo damaged.

A considerable proportion of these disasters to life and property was due to the inability of the vessels involved to seek a harbor of refuge in the vicinity where they were disabled or wrecked.

Digitized by Google

A large amount of the raw products of the South is at the present time carried by sailing vessels, and therefore a harbor of refuge is especially desirable for craft of this character.

In view of these facts, the Board of Underwriters, while considering the matter in all its different phases, has come to the conclusion, after consulting shipmasters and others familiar with the subject, that a harbor of refuge on the North Carolina coast should be established, and that no part of the coast would be better fitted for such a harbor than Cape Lookout, the conditions being more favorable there than at any other part of the coast. This board therefore urges that arrangements be made looking to the establishment of such a harbor, for the safety of vessels trading along the coast.

Respectfully, yours, A. A. RAVEN, *President.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

THE NATIONAL BOARD OF MARINE UNDERWRITERS,
New York, November 16, 1911.

SIRS: We, the National Board of Marine Underwriters, learning that the United States Government is considering the establishment of a port of refuge on the North Carolina coast, and that the necessity of and proper location for same has been referred to you by Congress, through our long experience as marine underwriters, beg to emphasize and impress upon you the urgent necessity for such a harbor of refuge.

We are influenced in our action generally and particularly for the following specific reasons:

(1) According to statistics on file in the Treasury Department of the Life-Saving Service during a period of 20 years ending December 31, 1909, 2,250 lives were lost on the North Atlantic. In addition to this, the property loss is shown to be as follows: Of 139 vessels of all classes lost or overtaken by disaster on the North Carolina coast there were 111 strandings, 6 destroyed by fire, 3 foundered, 3 were disabled through accidents to machinery, 7 suffered damage to hulls, masts, and rigging, 2 were capsized, 2 struck sunken wrecks, and 3 had their cargoes damaged.

A very large proportion of this immense loss of life and property was directly due to the absence of a harbor of refuge in the vicinity of the disaster and which could be reached by the vessels involved.

(2) *Steamships, towboats, etc.*—The establishment of a harbor of refuge on the North Carolina coast would be in the interest of safety and economy to all classes of vessels, and its close proximity to established steamship lines would particularly recommend it, inasmuch as disabled steamers could seek this harbor to effect necessary repairs at considerable saving in cost and time involved to both owners and underwriters.

(3) *Sailing vessels.*—A large amount of the rough products of the South is at the present time being carried by sailing vessels, and a harbor of refuge therefore would be especially desirable for craft of this character.

(4) *Inland waterways.*—The recent completion by the Government of the Cour Sound Canal connecting Pamlico Sound with Beaufort Inlet, the completion of the Cape Cod Canal, and the improvement of the Chesapeake & Albemarle Canal, connecting the Elizabeth River with Albermarle Sound, will make an inland waterway from Boston to Beaufort, N. C., accessible to and very generally used by tows and vessels of light draft.

The approach to this waterway is a very narrow channel, and owing to the character of the bottom constantly subject to change. In stormy weather, attended by high seas, the entrance to this canal would be impracticable, and unless a harbor or port of refuge were near at hand, vessels or tows approaching this inland waterway would be in grave danger.

Generally speaking, to establish such a harbor of refuge would be very greatly to the interest of owners and underwriters of vessels of all classes navigating these waters, and therefore we, the undersigned, would strongly recommend that your board report favorably and emphatically for the establishment of a harbor of refuge on the North Carolina coast, and we would recommend further that the proper appropriation for same be made by Congress.

Respectfully, yours,

THE NATIONAL BOARD OF MARINE UNDERWRITERS
HERBERT APPLETON, *President.*
R. H. CALLETT, *Secretary.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

STATEMENT OF OWNERS AND AGENTS OF VESSELS ENGAGED IN COMMERCE ALO THE ATLANTIC SEABOARD.

NEW YORK, *October 30, 1911*

SIRS: We, the undersigned owners and agents of vessels engaged in commerce al the Atlantic seaboard, understand that you are to give a hearing on November 1911, at Beaufort, N. C., for the purpose of hearing such evidence as may be submitt to you and receiving certain petitions regarding the establishment and proper lo tions of a harbor of refuge at some point on the North Carolina coast.

Realizing the importance of this meeting to marine interests, and responding your request that all interests shall be represented at this meeting, after caref considering the merits of both Cape Lookout and Cape Hatteras, we are convin that Cape Lookout is the proper location, having many advantages over Cape Hatter and have delegated Capt. John G. Crowley to represent us at this hearing.

(Signed by 13 owners and agents.)

To the BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. MASON L. W. WILLIAMS.

BALTIMORE, *April 15, 191*

DEAR SIR: Answering your letter of April 14 in reference to Cape Lookout Cove harbor. As you will see by the map, Cape Lookout forms a harbor in the shape horseshoe with an opening on the west, making one of the best harbors on this c

If there was a breakwater built at the opening to protect the only unprotected it would make a perfect harbor.

About four years ago, when we were operating the steamship *George Weems*, b she was destroyed by fire, we started to use this harbor in bad weather; since that t all our ships have been there, and all the other lines operating on this coast have sou this harbor in very bad weather.

The locality is very much better than any of the other points that have been s gested, and as it is the closest to Hatteras, and to sailing vessels waiting for fair weat to round Hatteras, it affords a good place to anchor.

The entrance to Beaufort is very narrow and difficult to go into in bad weath whereas Hatteras Inlet, the other point, is so close to Cape Hatteras that vessels gett that far north would certainly not go into harbor, but go around Hatteras to Ca Henry.

I would thank you very much to use your efforts to have this breakwater built have taken this matter up with a great many captains, and all agree that it would b great relief to have this harbor in bad weather.

Yours, truly,

MASON L. WEEMS WILLIAMS.
General Manager.

Mr. JAMES B. HESSONG,
Secretary and Treasurer, Baltimore Chamber of Commerce, Baltimore, Md.

LETTER OF BALTIMORE CHAMBER OF COMMERCE.

BALTIMORE, *May 24, 191*

DEAR SIR: Referring to your letter of some time ago requesting the views of t shipping interests at this port regarding the proposed "harbor of refuge on the c North Carolina," the maritime committee of this chamber took the matter up with steamship companies engaged in coastwise trade, and I understand that many h replied direct to you.

The attached copy of letter from the Baltimore & Carolina Steamship Co. might have been received and I send it with the hope it might be of interest.

Yours, respectfully,

JAS. B. HESSONG, *Secretary*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

LETTER OF BOSTON CHAMBER OF COMMERCE.

NOVEMBER 2, 1911.

SIR: With further reference to your letter of April 11, 1910, addressed to the Boston Chamber of Commerce, and to subsequent correspondence, the committee on maritime affairs of the Boston Chamber of Commerce has again had before it the matter of the creation of a harbor of refuge on the coast of North Carolina, and after very full consideration of the subject and of additional information in hand, you are advised that the Boston Chamber of Commerce, having made inquiries amongst the masters sailing from Boston as to their preference in the matter of the location of said harbor, finds that a majority of the masters of coastwise vessels of all kinds, both steam and sail, sailing from this port and passing along the coast, favor Cape Lookout as a location for the same, if a harbor of refuge is to be constructed on the North Carolina coast.

The chamber of commerce is in receipt of a copy of the public notice issued over the signature of Capt. L. H. Rand, United States Army, district engineer officer, Wilmington, N. C., under date of October 28, to the effect that a public hearing will be held on the 7th instant, at Beaufort, N. C., on the matter, and you are advised that Capt. John G. Crowley has been appointed to represent this organization at the hearing.

The chamber has made no investigation relative to the merits of the places suggested as locations for the proposed harbor of refuge, or of the engineering difficulties involved, other than to obtain the opinion of masters of sailing and steam vessels belonging to this port; and as stated above, the majority of them favor Cape Lookout as the best location.

Yours, respectfully, JAMES A. MCKIBBEN, *Secretary.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF W. S. MONTGOMERY.

NEW YORK, *November 3, 1911.*

DEAR SIRS: There has been brought to our attention a petition requesting an expression of opinion as to whether a harbor of refuge shall be located at Cape Hatteras or at Cape Lookout.

We have given the matter some consideration and it appears to us, from an experience gained in handling admiralty causes, that shipping interests will be best served by locating the harbor of refuge at Cape Lookout. The special point which appeals to the writer, who has had some personal experience in navigating ships, is the fact that a harbor of refuge at Cape Lookout would be much more easy of approach on account of the climatic conditions and, more especially, on account of the regularity with which the water shoals.

Very truly, W. S. MONTGOMERY.

To the BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. W. T. WILLIS.

NOVEMBER 6, 1911.

DEAR SIR: Replying to your inquiry as to my opinion of the feasibility of building a breakwater at Hatteras, I beg to reply that I do not see how it is possible. I have fished over the shoals there year in and year out and I know that they are constantly shifting. My father piloted the lighthouse boat *Holly* out to the outer shoals on one occasion when the Government was investigating the shoals with a view to constructing a light on the shoals. I have heard him say that the outer shoals were dry that day and the gulls were sitting on the shoals, but when they got there there was not a man on board that would trust himself to get out on them. The quicksand was so soft that they could shove their oar right down out of sight. While mate on a coasting vessel I passed Hatteras on one occasion and saw a large steamship on the shoals. Upon my return trip the vessel had gone down out of sight. We sailed in Hatteras Inlet on that trip and on our way out that same vessel was buried so deep in the sand that we could see only a little of her masts sticking out of water. On our return trip the same ship was lying in the middle of the slough, showing that the shoal in which she sank had cut entirely away. Even if it were possible to construct a breakwater there, I do not see how it would be beneficial to navigation for the reason that a vessel bound up the coast with a heavy southwest wind would not want to stop there, and if a vessel

Digitized by Google

was bound south before a heavy northeast wind it could not possibly get into the breakwater, as I have never seen a vessel that could beat up under Hatteras in a northeast gale by reason of the tremendous current. Another very bad feature at Hatteras is the fact that there is no holding bottom at Hatteras. I have seen a number of vessels drag off the beach while anchored up under the beach—in fact, anchors will not hold there in a heavy blow.

I have heard this matter discussed by a number of coasting captains and I have never heard one favor Hatteras as a "harbor of refuge."

Very truly, yours,

W. T. WILLIS,
Keeper Core Bank Life-Saving Station

P. S.—Having been born and reared there, I dislike to have to make this statement but it is my judgment and experience.

W. T. W.

Mr. M. L. WILLIS,
Secretary Chamber of Commerce of Morehead City, N. C.

LETTER OF HON. JOHN H. SMALL.

WASHINGTON, N. C., *November 9, 1911.*

MY DEAR SIRS: Referring to the proposition before your board for a harbor of refuge at Cape Lookout. There did not seem to be any favorable opportunity presented on the steamer Tuesday afternoon for me to present any additional argument to the board. I do not wish to indulge in repetition, but simply to present one phase of this matter.

There is substantially no harbor of refuge between Delaware Bay and the Gulf of Mexico. I believe that the board are satisfied as to the availability and advantages of Cape Lookout. Nature has made the harbor in part, and it only remains for the Government to enlarge and complete the same.

Again, I can not think there is any doubt as to the necessity of the establishment of this harbor of refuge. The evidence upon this phase seems to be strong and convincing.

Furthermore, if a harbor of refuge should be established at this point, it would mean that railway connection would be made with the harbor, and a commercial station established as a basis for the supply of coal, ship chandlery, provisions, and the necessary appliances for making temporary repairs, at least for disabled vessels and steamers. Col. Kingman, division engineer, in one of the former reports contended that it was impracticable to make this a commercial port or city. This may be true, but this is quite a different proposition from making a commercial station for the supplying of the necessities of ocean-going craft, both coastwise and foreign.

May I submit one other proposition. If Cape Lookout is the most available location for a harbor of refuge, if such a harbor is a necessity for our coastwise shipping and for foreign ships, and if it will result in connection by rail with the establishment of facilities for supplying the necessities for operation and repair of ships taking refuge there, then there are strong reasons for a favorable report in the interest of the distribution of commercial facilities. There is absolutely no reason why eastern North Carolina should tbe tributary always to Chesapeake Bay. Based upon the above premises, we have a right to demand, through Congress, legislation which will result in the establishment of this harbor of refuge, and we propose to be persistent until this beneficent purpose is accomplished.

Very respectfully,

JNO. H. SMALL, *M. C.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE PRESIDENT OF THE ATLANTIC DEEPER-WATERWAYS ASSOCIATION.

PHILADELPHIA, *November 27, 1911.*

DEAR COLONEL: I am advised that your board is considering recommendations for a harbor of refuge at Cape Lookout on the north coast of North Carolina. My information is that this would be a very desirable improvement. To-day I took some pains to inquire amongst shipping men as to this project and found it the general opinion that a harbor at Cape Lookout is badly needed and that it would be of general service to vessels doing a coastwise business. This applies particularly to the lumber trade, or such of it as takes the outside course.

Very truly, yours,

J. HAMPTON MOORE, *President.*

Col. W. T. ROSSELL, *Corps of Engineers,*
Senior Member, Board of Engineers for Rivers and Harbors.

Digitized by Google

TTER OF THE SECRETARY OF THE CHAMBER OF COMMERCE OF THE STATE OF NEW YORK.

NEW YORK, *December 8, 1911.*

DEAR SIRS: I beg to inform you that at the meeting of the Chamber of Commerce he State of New York held yesterday, December 7, upon report of the committee insurance, signed by the following gentlemen, Anton A. Raven, Lowell Lincoln, lliam N. Kremer, Elbridge G. Snow, Charles A. Peabody, and Cecil F. Shallcross, resolution given below was adopted:

"*Resolved*, That it is highly recommended by the Chamber of Commerce of the te of New York that the United States Government, in the selection of a suitable t of the coast of North Carolina for a harbor of safety, decide upon Cape Lookout a most desirable point for its establishment."

Yours, very truly,

SERENO S. PRATT,
Secretary.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF HUDSON TRANSPORTATION CO.

NORFOLK, VA., *April 14, 1910.*

GENTLEMEN: Replying to your inquiry of the 11th instant, relative to a proposed bor of refuge for coastwise and deep-draft vessels on the Atlantic coast between e Hatteras and St. Johns River, Southport, Fla., our judgment is that Cape okout is the best locality for a harbor of refuge that can be named between these nts, from any and every point of view, and our judgment is based on actual experi-e in the coastwise trade between these points of about 30 years' duration.

Yours, truly,

HUDSON TRANSPORTATION CO.,
By GEORGE F. PHILLIPS,
General Freight Agent and Treasurer.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE VICE PRESIDENT AND GENERAL MANAGER.

NEW YORK AND CUBA MAIL STEAMSHIP CO.,
New York, April 15, 1910.

SIRS: Replying to your communication of the 11th instant, I beg to say that, after ving consulted the various captains of our line in relation to the proposed estab-hment of a harbor of refuge on the coast of North Carolina, this company is disposed favor the selection of Cape Lookout as the site thereof.

Respectfully,

ALFRED GILBERT SMITH,
Vice President and General Manager.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF CHARLESTON PILOTS' OFFICE.

CHARLESTON, S. C., *April 15, 1910.*

SIRS: In answer to yours as to the act of March 3, 1909, as to providing a harbor of fuge for largest coastwise vessels, we don't think the port of Beaufort, N. C., a fit ace for a harbor of refuge.

The harbor of Southport, N. C., is a fairly good harbor for coastwise vessels now.

We think Cape Lookout could be made a good harbor of refuge, as it is used to some tent at present. A great number of coastwise vessels go in Cape Lookout Bight, and would be used to a great extent if improved.

Very respectfully,

J. C. PETERS,
Secretary and Treasurer.
GEORGE H. SWAN,
Manager.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Digitized by Google

LETTER OF STANDARD OIL CO. OF NEW YORK.

NEW YORK, *April 16, 19*

SIR: Referring to your favor of 11th instant:

Our captains believe that the best harbor of refuge on the North Carolina coast w be at Cape Lookout, on account of its location, as it is protected from northwest winds and would require only protection from east, south, and west winds for c and deep-draft vessels.

More vessels have been lost between Cape Lookout and Cape Hatteras th other point on the coast, our captains report, and they believe that a harbor of r at Cape Lookout would tend to lessen the number of disasters to vessels in the vi of Cape Hatteras.

Yours, truly,

STANDARD OIL CO. OF NEW YO
O. L. HALENBECK.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF M. P. SMITH & SONS CO.

NEW YORK, *April 18, 19*

GENTLEMEN: Yours of the 11th reached us, and we have gone carefully ov contents and have talked with our schooner captains who trade between h South Atlantic lumber ports. They do not all agree on the same point for a har refuge, but do agree that it should be either Cape Lookout or Hatteras Cove. them argue that Cape Lookout is already a very good harbor; and if there were a at Hatteras Cove, vessels would not have to run back as far (to Cape Look shelter when they can not get past Diamond Shoals.

Very respectfully, yours,

M. P. SMITH & SONS C
Per B. J. BRYANT.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF CLYDE STEAMSHIP CO.

NORFOLK, VA., *April 25, 19*

DEAR SIR: Again referring to yours of April 11, which, as heretofore advised sent to Mr. H. H. Raymond, vice president and general manager of this comp who is also vice president and general manager of the Mallory Line of steamsh am inclosing herewith his letter of the 22d instant, written me after interviewin masters of ships that are trading between New York and southern ports. He st the consensus of opinion expressed by them that the harbor of refuge better be at or near Cape Hatteras than at any other point on the North or South Carolina He has been made to understand that there is a good harbor at Southport as w fair one for medium-draft vessels at Cape Lookout Cove, but that between L Cove and Cape Henry there is no place of refuge even for small vessels.

It is his opinion that a safe harbor of refuge could be built and maintained j the south of Cape Hatteras in the bight, which would be the most useful point o Carolina coasts for this purpose.

Considering that the Clyde and Mallory Lines operate twice as many coastwise s between New York and southern ports as any other line on the coast, the judgme their masters should be given careful attention.

Yours, truly,

JAS. W. MCCARRICK,
General Southern Agent

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF CLYDE STEAMSHIP CO.

NEW YORK, *April 22, 19*

DEAR SIR: Returning herewith letter of W. C. Langfitt, Lieutenant Colonel, of Engineers, Washington, D. C., addressed to you under date of April 11, rega a harbor of refuge, coast of North Carolina, would say that this question has be cussed with our captains and they are almost unanimous in the opinion that a ha

Digitized by Google

f refuge as outlined in inclosed letter would be better located at or near Cape Hatteras ıan at any other point on the North or South Carolina coasts. I understand that ıere is at present a good harbor at Southport, as well as a fair one for medium-draft essels at Cape Lookout Cove, but between this point and Cape Henry there is no lace of refuge even for small vessels. It is also their opinion that a safe harbor of ·fuge could be built and maintained just to the south of the cape in Hatteras Bight, hich would be the most useful point on the Carolina coast for this purpose.

Kindly convey these views to Lieut. Langfitt.

Yours, very truly,

H. H. RAYMOND,
Vice President and General Manager.

Capt. JAS. W. MCCARRICK, G. S. A.,
Norfolk, Va.

LETTER OF BRUNSWICK STEAMSHIP CO.

NEW YORK, *June 1, 1910.*

SIR: Acknowledging yours of April 11, relating to a harbor of refuge for coastwise essels. Investigation of this subject among our various masters brings us to the conlusion that Cape Lookout is by all means the most desirable place for this harbor, and ıat a harbor such as described would be most desirable.

Yours, very truly,

C. L. DIMON,
General Manager.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF NEW YORK AND CUBA MAIL STEAMSHIP CO.

NEW YORK, *October 31, 1911.*

DEAR SIR: Please refer to your circular of October 23, to the members of your assoiation, inclosing a petition which you desire to have the masters of our vessels sign, iving their opinion as to whether they prefer a harbor of refuge located at Cape Lookut or Cape Hatteras.

I find that in April, 1910, at the request of Capt. Earl I. Brown, Corps of Engineers, 'nited States Army, I consulted all the captains of our line and under date of the 15th f April I replied to him stating that our captains were disposed to favor the selection f Cape Lookout as the site for the proposed establishment of a harbor of refuge on the outh Carolina coast.

Yours, truly,

ALFRED GILBERT SMITH,
Vice President and General Manager.

Mr. W. M. BRITTAIN,
Secretary American Steamship Association,
Pier 25, North River, New York City.

DATA AND FACTS WITH REFERENCE TO CAPE LOOKOUT AND CAPE HATTERAS PRESENTED BY MR. J. F. DUNCAN.

In the matter of the location and construction of a harbor of refuge on the North 'arolina coast.

A harbor of refuge for the largest coastwise vessels, to be located at some point on he North Carolina coast, is a recognized necessity and a desirable project worthy of eing undertaken by the United States Government. The selection of the precise ocality at which such a harbor should be built is dependent upon the comparative dvantages and value of such places as may be available for the establishment and naintenance of the same.

A harbor to be of practical use and of present and permanent benefit and value to he steamships and sailing vessels on the Atlantic coast should (1) have good, firm, nd holding bottom or bed, providing sure anchorage; (2) have a capacious area, so as o accommodate not only the present class of sailing and steam vessels but also to proide for the requirements of the future class of enlarged steam vessels and all oceanoing craft; and to accomplish this end there should be (*a*) a large water area, and (*b*) large and available tract of land surrounding same, so that adequate land facilities or ingress and egress to and from the harbor may be provided (and such landed area

Digitized by Google

will also serve as a shelter to the harbored vessels); (3) have depth sufficient to a-
modate, at any and all times, all classes of ships that sail the ocean; and (4) be a
ated and constructed that at any and all times such harbor shall be accessib
vessel, steam or sail, which may have occasion to use the same; and also acc
rail and water communication with the interior.

Cape Lookout is prominently situated on the coast of North Carolina and is
midway between Norfolk and Charleston, the distance from Norfolk to Cape L
being about 225 miles and the total distance from Charleston to Norfolk being
miles.

Cape Lookout is approximately halfway between Cape Hatteras and Cape F

Cape Lookout is situated at the extreme southeastern point of Shackleford
an area of land extending from the eastern confines of Beaufort Inlet along the
of Core Sound and the Atlantic Ocean a distance of about 9 or 10 miles.
eastern end this area of land broadens out, extends into the Atlantic Ocean in
what curved lines, making a formation shaped like a half inverted V, the rig
of the V representing the main beach, the left prong representing the pr
known as Wreck Point, and between the two lines is Lookout Bight.

This bight is a sheltered harbor; has a good, hard bottom; spacious areas; is a
ble at all times, no pilot being required; has now a sufficient depth to accom
coasting vessels and steamers of medium draft, and can easily be so construc
maintain a depth sufficient to carry the largest ocean vessels.

That this location is close to the course of vessels going north and south is ev
by the fact that yearly this unimproved harbor is becoming more s
schooners and steamships of a draft not exceeding its present capacity of some
feet. (Recently in a northeast wind of some violence there were harbored
point 18 or 20 large schooners, and at this writing there are sheltered
bight 5 or 6 coasting vessels.) This condition serves to indicate that if a
expenditure be made by the Government at this point, making the present
deeper, then the largest vessels, of deepest draft, could and would avail them
the advantages now already open to those smaller craft which are acquainted
existing conditions.

The property loss at or near Cape Lookout during a period of 10 years ending
1908, is shown to be approximately $2,250,000. The record of property a
saved during this same period by reason of the natural advantages obtai
Cape Lookout is not available.

To estimate in dollars and cents the value of this harbor improved is impossible
approximate losses stated merely serve to show the present necessity of it. So
of its value may be impressed by a consideration, however, of the lives which
actually saved thereby; the property protected and conserved; the immense
of the dangers attending seafaring and navigation; and the directly resulting
benefit to the whole country by reason of the materially reduced cost of transpo

Further, a harbor must be not only a place where security and safety can be pr
found, but it must also be at a point at which supplies, repairs and necessaries
vessel can be obtained, both for its present emergency and also for its continuin
therefore, such a harbor must have some physical connection with the terri
which it is located. At Cape Lookout this condition is obtained.

The commercial feature of a harbor of refuge at Cape Lookout is also an imp
consideration; and although the main purpose is to provide a port of safety and
for vessels, yet the growth and development commercially of such a harbor is a ne
and certain consequence of its establishment at this point.

The harbor, if established, will have good water communication with the in
there is no bar at its entrance; no pilotage is required; and it will be directly
course of vessels going south and north; further, such a harbor will have rail co
nication, by means of the Norfolk & Southern Railroad Co., which proposes
tend its line from its present terminus at Beaufort to this place, such extens
quiring only about 2 or 2½ miles of bridging; and thus the coal fields will be acc
to it, a coaling station will be established, and a depot for supplies and necessar
all classes of vessels.

At Cape Lookout Harbor a depth of 35 or 40 feet can be obtained at less than
mington's 24 feet cost, and less than half of the cost of Savannah's 22 feet.

The expenditure involved in the improvement at Cape Lookout, in making a h
of refuge for the largest ocean-going vessels, is merely nominal when compared
the present direct utility and value to be received by the seafaring public an
assured immediate and future commercial development.

Cape Hatteras is the northernmost of the three capes on the North Carolina c
It is about 150 miles from Norfolk and about 300 miles from Charleston. It is a
25 miles from the mainland, being located on a line of beach over which the
flows at high tides. It extends more than a mile into the Atlantic Ocean, be

Digitized by Google

which point invisible reefs and bars stretch out 12 to 15 miles, forming "Diamond Shoals."

Considering this point as to the four essentials enumerated, Hatteras has not a good, firm, holding bottom, providing safe anchorage at all times. At the places near Hatteras, a mile or two offshore, where anchorage at times can be obtained, it is not safe for the boat to lay, and it is impossible ofttimes to secure even this anchorage.

While the area at Hatteras is sufficient in extent, yet it is of such character and formation as to render it of small, if any, practical utility and value. The water about Hatteras is capacious but has little depth, being flatty. The landed area is soft and sandy, has little foundation, and frequently (when covered by beach tides) forms quicksands, over which it is impracticable to travel even by horse for some long periods.

The depth in and about Hatteras is shallow, the bottom being somewhat flat and shoaly.

Hatteras is not easy of access, either by water or from the land.

If a harbor should be put at Hatteras it would have to be on the south or west or southwest side. Then a vessel coming from the north, in stress, with prevailing north wind, would have to go 14 miles offshore to get around the point, and when arrived at this point the ship can make Lookout Point more easily than it could then reach such harbor, if provided, at Hatteras.

Because Diamond Shoals run about south, and to make it into Hatteras under such conditions would require a "dead set" to get back, and from such point Lookout is only 60 miles, and could be more easily reached, and just as quickly.

If a vessel, steam or sail, going north gets into Hatteras Harbor (provided built) for refuge on a north or northeast wind, and the wind shifts to southwest, it could not get out to proceed on its voyage on account of the rough waters over the flatty bottoms adjacent to it. Under such conditions it could get out from Lookout Harbor, and this is evidenced by the fact that it is being done by the smaller vessels frequently during each and every year.

A harbor at Hatteras would not stand a hard southwest wind; and this statement is based on the fact that the foundations would be "quick" or "live," and on the experience of the Government with the construction attempted of lighthouses at or near this point.

The tides and currents at Hatteras are peculiar, and no seaman professes to be able to give any reason for their action nor to understand them. The current runs differently at one time from another and can not be figured on, thus making treacherous navigation. The property loss at Hatteras is due doubtless to this fact.

No vessel would attempt to make a harbor at Hatteras, were one provided, except compelled to do so by stress of weather. This is true because of the difficulty of getting into this point and the difficulty of getting out again. And when such boat is in stress the harbor could not be made from the fact that no boat would attempt to make it so long as there were any chances of passing it, and then such attempt would be useless; and this is true without regard to the fact as to whether or not there be any harbor placed at Lookout.

Commercially considered, Hatteras is not of any importance, for the reason that it has not, nor can it ever possess, any physical connection with the interior. If such connection could be obtained the cost of securing same would so far exceed the ultimate benefit possible as to render the attempt grossly uneconomic.

The two points indicated above would appear to include such localities as might be considered available for the class of harbor which should be constructed.

Southport is not of value as a harbor until after the bar at its entrance is passed; and this feature will in itself prevent the use of the refuge at the very time and for the very purpose for which it is to be constructed.

Considering the comparative advantages and disadvantages of Lookout and Hatteras, we suggest:

Lookout is geographically so situated as to make it the logical resting point on the present Atlantic seaboard. Lookout has a good anchorage ground, capable of easy improvement. Hatteras has no natural advantage, and the costs of creating this improvement will be excessive as compared with the ultimate benefits obtained.

Lookout has plenty of area, both water and land; Hatteras has excessive area in quantity of acreage of both, but the water is flat and shoaly, and the land is not susceptible of economic improvement.

Lookout has now a depth of 14 to 16 feet, and a small expenditure will give 35 or 40 feet; Hatteras has a depth of some 7 or 8 feet, and to secure a proper depth the expenditure will about equal the cost of Savannah's 22 feet, and nearly double the cost of Charleston's 26 feet, and there will be no resulting commercial benefit at Hatteras in any proportion to that at the two points named and already existing.

Digitized by Google

Lookout is easy of access, with no bar at its entrance, no pilot required, no p- entry fees, with good rail and water communication with the interior, and l.. almost directly on the track of passing vessels going north and south. Hat.. difficult of access at the very times when its use will be most required and n.. it has not communication with the interior, except by shallow, light-draft b.. has no physical connection with the mainland, and the vessels going north ar.. do not approach it any closer than absolutely driven to do by stress of weather

The statements herein made are based on data and information obtained by c sation and quizzes with experienced men, who know the sea and the different .. ties discussed; and same is submitted with the sole view of rendering such a.. possible to the board in determining the most available place for the proposed .. of refuge on the coast of North Carolina.

In conclusion I beg leave to submit that the suggestion that the present har.. Savannah and Norfolk will serve the territory tributary to Lookout better than a .. at Lookout, if adopted, will, by the same reasoning, dispense with the Hatteras Wherefore such suggestion is in direct conflict with the recognized and admitt.. that a harbor on the coast of North Carolina is a necessity.

Naturally, Savannah, Norfolk, and Wilmington will not be enthusiastic ab.. proposed location, for purely commercial reasons. These ports now serve such .. tory at a large business benefit. Hatteras is impracticable, if not impossible, w.. fore the plea of marine interest to be served is given especial prominence in or.. conserve the commercial advantages already enjoyed by the ports indicated.

Respectfully submitted.

J. F. DUNCAN, *Beaufort, N.* ..

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

NOVEMBER 7, 1911.

LETTER OF MR. W. A. SANDERS.

WILMINGTON, N. C., *November 6, 1*..

DEAR SIR: I note by the papers that you will have a hearing on next Tuesday River and Harbor Board of Engineers on the subject of making a harbor of r.. Cape Lookout. Would like very much to be present at this meeting to say som.. in favor of Cape Lookout as a harbor of refuge.

Have been master on an ocean tug towing on the Atlantic coast for a good .. years, and have used Cape Lookout Cove a number of times, and am confiden.. we have saved several vessels from loss by going in Cape Lookout Cove.

About four years ago we sailed from Wilmington, N. C., towing bark *Lauren*.. for Norfolk, Va., draft 22 feet. Between Frying Pan Shoals, at Cape Lookout, w.. company with steamship *Aragon*, towing lumber barge from Georgetown, S. C. .. wind increased from the east; we made Cape Lookout for a harbor. Steamship .. remained out. Wind continued to increase, and barge was lost with six men. .. the *Aragon* run for Cape Lookout, all would have been saved.

If you notice the New York Herald marine news, you will notice that a good .. vessels use Cape Lookout Cove for a harbor and never have attempted to run for .. teras nor use it for a harbor. I have talked with many masters of vessels and .. riably they favor Cape Lookout as a harbor of refuge, and I sincerely trust th.. Board of Engineers will decide in favor of Cape Lookout, as I believe it will only .. little improvements to make it safe for any draft.

Vessels after making harbor usually require supplies, coal, or fresh water, p.. some ironwork or carpenters, which could be had at Beaufort or Morehead .. Impossible to obtain any such service at Hatteras.

Yours, very truly,

W. A. SANDERS,
Master Marine

Mr. C. L. DUNCAN,
Vice President Beaufort Chamber of Commerce, Beaufort, N. C.

Digitized by Google

LETTER OF MR. W. H. GASKILL.

CAPE LOOKOUT LIFE-SAVING STATION,
Harkers Island, N. C., November 6, 1911.

DEAR SIR: I am exceedingly sorry to say I am not well enough to be with you to-morrow at Beaufort to attend the meeting of the Board of Engineers, of Washington City, and others interested in the building of a harbor of refuge at this place, which has all the advantages over either Cape Hatteras or Cape Fear, as this is practically a natural harbor, only requiring one jetty a mile or even a half mile long to protect shipping from southwesterly gales, and the harbor is complete, and the Navy of the United States can lay in it protected from all winds, so much so that small boats could pass from ship to ship or from ship to shore and land to a wharf or to the beach without contending with any rough water whatever.

If the engineers have the time to do so before returning to Washington, it would be advisable for them to visit Cape Lookout and see the advantages this place has over any place between Cape Henry and Charleston to build a harbor of refuge. One of the important advantages there is at present a sufficient harbor here to protect from all storms barges, derrick scows, and other craft which will be needed in the work which is absolutely necessary for their protection and safety.

Respectfully, yours,

WM. H. GASKILL,
Keeper of Cape Lookout Station.

Mr. M. L. DAVIS, *Beaufort, N. C.*

LETTER OF MR. J. B. WOOD.

BALTIMORE, MD., *April 5, 1910.*

DEAR SIR: Your letter, with inclosure from the United States Army engineer's office, received, and in reply would say that I think the value of such a harbor of refuge would undoubtedly justify its construction, and I think Cape Lookout the best location, as a vessel at Hatteras would only be a short run from the Capes of Virginia, and with this harbor at Lookout it would be more available for vessels that may need to use it.

If it was located at Southport a pilot would be necessary, as that bar is quite difficult and pilots are not always available when needed, and the same may be said of Beaufort; and, speaking from my experience in coastwise sail vessels, would much prefer it at Lookout, but if it was placed at Hatteras it should be in the cove, as all of our dangerous storms are from the eastern board and a vessel north of Hatteras with a western or southwestern storm would either make a lee under the beach or anchor or return to Chesapeake, and of course with an eastern one could reach the harbor of refuge.

Yours, respectfully,

J. B. WOOD,
Master Steamship "Indian."

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

LETTER OF MR. OSMYN BERRY.

SAVANNAH, *April 6, 1910.*

DEAR SIR: In reply to yours of the 4th instant, regarding a harbor of refuge to be located near Cape Lookout, N. C., I think that a harbor so located at Lookout would be the practical place for it, as from its geographical position it would shelter vessels lying there from any hard storms from northwest so around to east by the way of north, affording good anchorage in plenty of water and having plenty of room to get under way from, etc. It would also be an ideal place for sailing vessels on account of its easy access to or from, being so well marked by Cape Lookout Lightship No. 80 and the Cape Lookout Lighthouse. It also appears to me that a refuge could be established here at less cost than at any other place along the North Carolina coast between Cape Fear and Cape Hatteras.

I would prefer the harbor to be to the southward of Hatteras, as it would be more sheltered from the stormy and easterly weather that prevails in that latitude, especially in the winter season.

Very respectfully,

OSMYN BERRY,
Master Steamship "Persian."

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

Digitized by Google

LETTER OF MR. G. J. HART.

PHILADELPHIA, *April* [illegible]

DEAR SIR: Your letter of the 4th, with attached letter from United States [illegible] office, has been carefully read and all details considered.

Hatteras would probably be the favored place by all classes of vessels. [illegible] prefer Cape Lookout; its natural advantages are superior to those of Hatteras, a[illegible] give as my choice Cape Lookout.

Yours, truly,

G. J. HART.
Master Steamship "Frederi[illegible]

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

LETTER OF MR. E. T. PAGE.

SAVANNAH, GA., *April 8*, [illegible]

DEAR SIR: Replying to your letter of the 4th instant, and also the letter a[illegible] of the United States engineer's office of 30th ultimo, relative to the prop[illegible] of a harbor of refuge for coastwise and deep-draft vessels to be built on the [illegible] North Carolina, I would state that I consider the most advantageous positi[illegible] be at Hatteras Cove, on the south side of the cape, because of its being about th[illegible] point of the coast between Sandy Hook and Tybee and the point of depar[illegible] land fall for the West Indian and Gulf ships; also that with a northeaster it is [illegible] to make a lee shelter and anchor close under either Cape Fear or Lookout, w[illegible] after passing Diamond Shoals there is no shelter until up the Chesapeake.

Yours, truly,

E. T. PAGE.
Master Steamship "Tu[illegible]

Mr. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF B. F. HATCH.

BALTIMORE, MD., *April 15*, [illegible]

DEAR SIR: Your letter of the 10th instant received, inclosing a letter fr[illegible] United States Army engineer's office in reference to a harbor of refuge on the [illegible] coast between Cape Henry and Charleston.

I think that Cape Lookout is the place to have it, as it is a very good harb[illegible] with the wind from east to the northward, also as it is halfway between Cape [illegible] and Charleston, and vessels getting caught between Hatteras and Cape Fear [illegible] northeast gale could make harbor then without much trouble.

Yours, truly,

B. F. HATCH.
Master Steamship "Cretan

Mr. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF MR. J. S. HUDGINS.

NEWPORT NEWS, VA., *April 16*, [illegible]

DEAR SIR: Your letter of the 4th instant received in regard to harbor of refu[illegible] the southern coast. I think a harbor of refuge at Cape Lookout, to shield vessel[illegible] gales from southeast, around southerly to west southwest, would be a good [illegible] especially for sail vessels and small steamers, as it is an excellent harbor now [illegible] northerly wind. If the channel to Beaufort could be dredged deep enough to [illegible] vessels in case they should be caught under Cape Lookout, the wind shifting sud[illegible] to the southward, I think it would answer all purposes, and perhaps the channel [illegible] be dredged much cheaper than the cost of placing a tremendous stone wall [illegible] outside to protect vessels in southerly gales, and I think the anchorage inside w[illegible] be much better than outside of Beaufort Harbor.

I think the south side of Cape Hatteras or Hatteras Cove would be the most de[illegible] place for a harbor of refuge. Should the Government decide on Hatteras, as I th[illegible]

Digitized by Google

; would be well intended to protect vessels in heavy northerly gales, with the wind) southward they can find protection on north side of Hatteras shoals without danger.

I think Southport would make a fine harbor, should the channel be dredged deep nough to admit vessels of deep draft, but do not think much of such an artificial arbor as would be built on the outside, and the cost would be enormous.

Yours, very respectfully,

J. S. HUDGINS,
Master Steamship "Essex."

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

LETTER OF MR. C. KIRWAN.

BALTIMORE, MD., *April 18, 1910.*

DEAR SIR: Replying to your letter in regard to harbor of refuge at Cape Lookout, will say that I think Cape Lookout is the proper place for such a harbor, and it will be ı great advantage and protection to coasting vessels, and especially sailing vessels.

In regard to Cape Hatteras, will say that I do not think such a harbor there would ustify its construction, but if there is one put there it would be best on the south ide.

Very respectfully,

C. KIRWAN,
Master Steamship "Merrimack."

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

LETTER OF MR. W. E. PAYNE.

BALTIMORE, MD., *April 19, 1910.*

DEAR SIR: Beg to acknowledge your letter in reference to the harbor of refuge at Cape Lookout, N. C., or Cape Hatteras.

I think Cape Hatteras would be the desired place for such a harbor, and on the south side of the cape. Sailing vessels could make it on the south side, coming from the north, and have a departure from Diamond Shoal Lightship, and running from the south would have good soundings. In my judgment the south side of Cape Hatteras would be the place more desired by seafaring men.

Yours truly,

W. E. PAYNE,
Master Steamship "Parthian."

Mr. J. M. BLANKENSHIP,
Superintendent, Baltimore, Md.

LETTER OF MR. W. J. BOND.

BALTIMORE, MD., *April 22, 1910.*

DEAR SIR: I am in receipt of your letter in reference to a proposed harbor of refuge located on the North Carolina coast.

In my opinion, and in my several years' experience on the southern coast, for a harbor of refuge, I consider a harbor located at Cape Lookout the most preferable location on the North Carolina coast.

Yours, respectfully,

W. J. BOND,
Master Steamship "Ontario."

Mr. J. M. BLANKENSHIP, *Superintendent.*

Digitized by Google

LETTER OF MR. S. T. HERBERT.

PHILADELPHIA, *April 22, 1910.*

DEAR SIR: In reply to your letter of the 22d instant, regard to a harbor of refuge would advise that Cape Lookout would be the most desirable place for same, as it is centrally located for coastwise vessels; but should Cape Hatteras be decided on Hatteras Cove would be the most desirable place.

Very respectfully,

S. T. HERBERT,
Master Steamship "Itasca."

Mr. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF OCEAN STEAMSHIP CO. OF SAVANNAH.

NEW YORK, *April 22, 1910.*

SIR: Your letter of April 11.

Our masters are of the opinion that Cape Lookout would be the most advantageous location for a harbor of refuge on the North Carolina coast, both on account of the depth of water and the formation of the land.

Yours, respectfully,

W. H. PLEASANTS,
Vice President and General Manager.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MR. MILES HILLARY.

BALTIMORE, *April 25, 1910.*

DEAR SIR: Yours of the 4th instant regarding a harbor of refuge for coastwise and deep-draft vessels received. I would suggest Cape Lookout as being the most desirable and practical location for a harbor of refuge.

First. Lookout Bight is at the present time a fairly good harbor for coastwise and deep-draft vessels with northwest, northerly around to east.

Second. Out strong winds and gales are easterly. Seventy-five per cent of the sailing vessels are caught in gales north of Cape Lookout, and a vessel can always run before a gale for a harbor of refuge when it would be impossible to work to windward.

Third. A vessel running for Lookout Bight will have Cape Lookout light vessel to run for, and after passing the light vessel she will have Cape Lookout light as a bearing to find the harbor of refuge.

Fourth. A vessel running for Lookout Bight will smoothen her water much sooner than she would off Hatteras Cove.

Fifth. The chances are that the weather would be clearer at Lookout than at Hatteras.

Sixth. Should a vessel miss the harbor of refuge in thick weather and get to the leeward, there is better and safer anchorage anywhere outside of Lookout Bight than there is at Hatteras Cove.

Yours, truly,

MILES HILLARY,
Master Steamship "Quantico."

Mr. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF MR. T. P. PRATT.

NORFOLK, VA., *April 25, 1910.*

DEAR SIR: Referring to your letter of file 77, I consider Cape Lookout the best location for a harbor of refuge on account of it being more centrally located and accessible.

If Cape Hatteras is selected, I should think that in Hatteras Cove would be the more desirable location.

Yours, very respectfully,

T. P. PRATT,
Master Steamship "Dorchester."

Mr. J. M. BLANKENSHIP, *Superintendent.*

Digitized by Google

LETTER OF MR. J. H. DIZER.

BOSTON, *April 25, 1910.*

AR SIR: Yours in regards to a harbor of refuge on the coast of North Carolina ed.

ink Beaufort or Cape Lookout is the proper place for a harbor of refuge, as Cape out is a good harbor and is easy to get into for coastwise and deep-draft vessels. only exposed to gales from east to west southwest. Southport or Cape Fear is ose to Charleston. I do not think it practicable for a harbor of refuge north of ras, as most vessels get disabled off of Hatteras or south of Hatteras.

Yours, respectfully,

J. H. DIZER,
Steamship "Nantucket."

. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF MR. J. JOHNSON.

BOSTON, *April 26, 1910.*

AR SIR: Copy of letter from United States engineer's office at Wilmington, N. C., gard to proposed harbor of refuge, received.

ave been south of Cape Hatteras but little in the last 30 years and can therefore ay claim to much knowledge in the matter, but it seems to me that such a harbor e southern coast, with its constantly increasing traffic, would be of the greatest rtance, and that Cape Lookout is the best location for same.

Yours, very respectfully,

J. JOHNSON,
Master Steamship "Kershaw."

. J. M. BLANKENSHIP, *Superintendent.*

LETTER OF MERCHANTS AND MINERS TRANSPORTATION CO.,
BALTIMORE, *May 2, 1910.*

EAR SIR: Referring further to your letter of April 11, and my reply of the 14th, gard to harbor of refuge, coast of North Carolina.

have had this matter up with our masters through Mr. J. M. Blankenship, superndent, and herewith inclose you copies of letters received from them, which elf-explanatory.

he concensus of opinion seems to be that Cape Lookout is the best place for this or of refuge.

Yours, truly,

J. C. WHITNEY,
President.

he BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF OCEAN STEAMSHIP CO. OF SAVANNAH,
NEW YORK, *October 16, 1911.*

EAR SIR: I understand Government intend to establish a harbor of refuge somere between Cape Henry and Charleston. If I am allowed to express my opinion, e Lookout would be the best place to establish such. Easy of access and to deop.

Respectfully,

GEO. MUNSON,
Master Steamship "Naroches."

he BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

O

Digitized by Google

Digitized by Google

2D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 535.

NEW HAVEN HARBOR, CONN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION AND SURVEY OF NEW HAVEN HARBOR, CONN., WITH A VIEW TO IMPROVING THE CHANNEL BY WAY OF OYSTER POINT TO THE BRIDGE OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., ON WEST RIVER.

FEBRUARY 12, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 10, 1912.

SIR: I have the honor to transmit, herewith, a letter from the Chief of Engineers, United States Army, dated 9th instant, together with copies of reports from Lieut. Col. Harry Taylor and Capt. A. E. Waldron, Corps of Engineers, dated October 13, 1910, and July 17, 1911, with map, on preliminary examination and survey, respectively, of New Haven Harbor, Conn., made by them in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 9, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated October 13, 1910, by Lieut. Col. Harry Taylor, Corps of Engineers, and July 17, 1911, with map, by Capt. A. E. Waldron, Corps of Engineers, on preliminary examination and survey,

Digitized by Google

respectively, of New Haven Harbor, Conn., with a view to improv the channel by way of Oyster Point to the bridge of the New Y New Haven & Hartford Railroad Co., on West River, called for by t river and harbor act approved June 25, 1910.

The General Government has already provided in the West R portion of New Haven Harbor a channel 100 feet wide and 9 feet d from the 16-foot anchorage basin in New Haven Harbor to Kimberly Avenue Bridge. Above this point private interests h constructed a channel of similar depth and 75 feet wide up to New York, New Haven & Hartford Railroad bridge. This priva constructed channel now appears to be of general commercial int est, and the district officer considers it worthy of improvement by General Government. Both channels have shoaled somewhat, present commerce requires even greater depths and widths than fi made.

The district officer recommends the deepening to 12 feet of the ex ing channels up to the New York, New Haven & Hartford Railr bridge with varying widths as indicated on the accompanying m and dredging a 6-foot anchorage basin for the accommodation small craft, all at an estimated cost of $50,000, with $4,000 annua for maintenance after completion. The division engineer concur these recommendations. The Board of Engineers for Rivers a Harbors, to whom the reports were referred as required by law, c curs in the opinion that West River is worthy of improvement up the New York, New Haven & Hartford Railroad bridge in the man proposed.

After due consideration of the above-mentioned reports I concur general with the views of the district officer, the division engine and the Board of Engineers for Rivers and Harbors, and therefore carrying out the instructions of Congress, I report as follows:

That the improvement by the United States of New Haven Harb Conn., with a view to improving the channel by way of Oyster Point the bridge of the New York, New Haven & Hartford Railroad C on West River, is deemed advisable so far as to secure an availa channel depth of 12 feet with varying widths and a 6-foot anchor basin, all as shown on the accompanying map, at an estimated c of $50,000 for first construction and $4,000 annually for maintenan these estimates being based on the supposition that the work will, a now seems desirable and advantageous, be prosecuted under a fir appropriation of the full amount of the estimated construction cos

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF NEW HAVEN HARBOR, CONN

UNITED STATES ENGINEER OFFICE,
New London, Conn., October 13, 1910.

SIR: I have the honor to submit the following report of a preliminary examination of New Haven Harbor with a view to improving the channel by way of Oyster Point to the bridge of the New York New Haven & Hartford Railroad Co., on West River, in compliance with the requirements of the act of Congress approved June 25, 191

Digitized by Google

West River lies between the city of New Haven and the town of West Haven, Conn. At its mouth the river widens and then empties into a large shallow bay known locally as West Haven Harbor, on which the main part of the dockage front of West Haven lies. The West River is crossed near its mouth by the New York, New Haven and Hartford Railroad on a pile trestle without any draw, and with a maximum horizontal clearance between bents of about 15 feet. Navigation above the railroad is therefore possible only for small unmasted craft. About 2,000 feet below the railroad trestle, the river is crossed by Kimberly Avenue, the main highway leading westerly from New Haven. The Kimberly Avenue Bridge has a modern draw of the lift type giving a horizontal clearance of about 45 feet. This bridge was completed in May, 1906.

In its original condition, the controlling depth in the channel between Kimberly Avenue and the railroad bridge above was not over 2½ feet, although depths of about 5 feet occurred in two places. There was also a second channel, bare at low tide, which led under a small fixed span to the eastward of the Kimberly Avenue Drawbridge up toward the railroad bridge, and which was somewhat used by small boats at high tide. Below Kimberly Avenue the controlling depth was not over 3 feet from the main harbor to the docks at West Haven. The channel leading from the harbor to the docks at Oyster Point had a controlling depth of 4½ feet, but between Oyster Point and the channel along the West Haven docks was a wide flat nearly bare at low tide.

Under authority of the river and harbor act of March 3, 1905, a project for the improvement of West River was adopted which provided for a 9-foot channel, 100 feet wide, from the downstream corner of the 16-foot anchorage basin of New Haven Harbor, via Oyster Point, to the dock frontage of West Haven and the Kimberly Avenue Bridge. This project was based on a report of preliminary examination and survey published in House Document No. 73, Fifty-eighth Congress, second session, and also in the report of the Chief of Engineers for 1904, page 996 and following. At the time the report referred to was submitted, Kimberly Avenue Bridge was a closed structure limiting navigation above that point to unmasted vessels of comparatively small size. The river and harbor act of March 2, 1907, consolidated the improvement of West River with that of the main harbor of which the former is a branch.

Under authority of the act of March 3, 1905, work was commenced May 14, 1906, and completed September 5 of that year, at a cost of $36,634.83, the channel having been dredged to full project dimensions throughout its length. The total yardage removed was 249,143 cubic yards, prism measurement, most of which was pumped ashore behind sod levees above the Kimberly Avenue Bridge. Immediately upon the conclusion of the contract for the dredging of this channel, arrangements were made by private concerns located above the Kimberly Avenue Bridge with the same contractors who had been dredging the channel below Kimberly Avenue to extend the 9-foot channel, with a width of 75 feet, upstream from Kimberly Avenue Bridge to the railroad bridge above, and also, with a turn, for a short distance down the easterly channel above referred to. This work, which was completed in the latter part of 1906, required the removal of 73,772 cubic yards, prism measure-

Digitized by Google

ment. At the conclusion of this work there was a depth of fully 9 feet available throughout this channel from the main channel in New Haven Harbor, via the docks at Oyster Point and West Haven, to the railroad bridge above Kimberly Avenue. The cost of the private work for dredging the upper part of this channel was about $10.00.

Since the original dredging was done a small amount of widening was done at the entrance of the West River channel from the 16-foot basin, in 1907, in order to provide a better entrance into the channel and in 1909 a considerable portion of the channel was redredged, the latter work being entirely maintenance work, and being the only work of this character which has been done since the channel was originally dredged in 1906. The cost of the maintenance work, exclusive of administration and inspection, was $4,314.43. It is now reported that considerable shoaling, but varying in extent, has taken place extending throughout the entire length of the channel, from Oyster Point up to and through Kimberly Avenue Bridge to the railroad bridge above.

The channel as originally dredged has proved very useful and has been much used, but, owing to the increased number and size of oyster boats employed at Oyster Point, complaint is made in regard to the present dimensions of the channel, and particularly with regard to the width at the first turn at Oyster Point. It is also complained that the existing project depth is insufficient for some of the larger boats, and that above Oyster Point even a very slight amount of shoaling seriously interferes with navigation, the existing project depth being insufficient for the deep-draft vessels which are more or less used in this portion of the channel. Moreover, that portion of the channel along the West Haven shore immediately below the Kimberly Avenue Bridge is very crooked and closely follows along the dock fronts, so that if any vessels are moored at these docks they necessarily project into the channel, and the result is that the available width of the channel is ordinarily considerably less than the project width.

The commerce of this section of New Haven Harbor for the calendar year of 1909 amounted to 123,815 short tons, having a valuation of $1,003,098.98, as shown in detail on the accompanying sheet. There are no wharves, so far as known, owned by the public in this section of New Haven Harbor, and the only wharf which could be considered as being open to the public on equal terms is one on the west side of the river immediately below Kimberly Avenue. About 200 feet of wharf front is here available, it is understood, to the public on equal terms, the wharf being owned by private parties. So far as known, the only public space available for wharf room in this part of the harbor which could be utilized to any advantage is in the vicinity of the sewer outlet at the southeasterly corner of Oyster Point and from there northerly between Bayview Park and the United States harbor line. Wharves could be constructed here, and by a small amount of dredging a channel could be made to lead to them from the Government channel. It is understood that this matter was brought up several years ago, but no definite action has been taken up to the present time.

The only connections between rail and water transportation which occur in this portion of the harbor are spur tracks which run from the main line of the New York, New Haven & Hartford Railroad Co.

Digitized by Google

ıto the yards of The Howard Co., above Kimberly Avenue, and the ɔur tracks leading from the main line of the railroad to the store-ouse and factory of the Sanderson Fertilizer & Chemical Co., some ttle distance back from the water front and connected therewith by causeway and small railroad for handling tram cars. Neither of ıese railroads are in any way open to the public so far as known.

There are no questions of the development or utilization of water ower for industrial or commercial purposes involved.

In my opinion the channel by way of Oyster Point to the bridge ıf the New York, New Haven & Hartford Railroad Co. on West River s worthy of further improvement by the General Government to the xtent of maintenance, straightening some of the worst bends, and ridening in parts, and to a moderate amount of deepening to accommo-late the large vessels which now use the channel. The channels lead-ng off from the main channel in New Haven Harbor have generally a lepth of 12 feet, and, provided the cost is not too great, it would ıppear advantageous to give the West River Channel this depth, and n any case to deepen it to not less than 11 feet.

In order to determine the exact condition of the channel at the ɔresent time and to obtain data upon which to base an estimate of the ·ost of straightening, widening, and deepening, as recommended above, ı survey, which it is estimated will cost $250, will be necessary.

Very respectfully, your obedient servant,

HARRY TAYLOR,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York City, October 14, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 31, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

Under authority of the act of March 3, 1905, a channel 9 feet deep and 100 feet wide was dredged from the 16-foot anchorage basin in New Haven Harbor by way of Oyster Point to the Kimberly Avenue Bridge. Subsequently a channel of the same depth and 75 feet in width was constructed by private interests from Kimberly Avenue to the railroad bridge above.

It appears that in some places the channel constructed by the General Government has not sufficient width to accommodate the vessels using it, and that a somewhat greater depth would be of material advantage. The district officer is of opinion that the channel by way of Oyster Point to the bridge of the New York, New Haven & Hart-

Digitized by Google

ford Railroad Co. over West River (including the channel dredged by private interests) is worthy of maintenance and of some widening, straightening, and deepening, and he recommends that an estimate of cost be authorized. In this view the division engineer concurs.

The commerce of the locality is reported as amounting to 12[illegible] tons, valued at approximately $1,000,000. Up to the present time there has been expended on this work by the General Government about $41,000. This is not a large sum when compared with the volume of commerce affected, and if additional width and perhaps some slight increase in depth, which it appears would facilitate commerce and navigation, can be provided at moderate cost, it is believed that further improvement to this extent would be justified.

To determine the question of cost, it is recommended that the survey proposed by the district officer be authorized, and that he be requested to furnish separate estimates for (a) restoring and maintaining the present project dimensions, (b) restoring and maintaining the channel constructed by private interests between the Kimberly Avenue and railroad bridges, and (c) any modification of the existing project deemed advisable.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 9, 1910.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of New Haven Harbor, Conn., authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *November 10, 1910.*

Approved as recommended by the Chief of Engineers in the preceding indorsement.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

SURVEY OF NEW HAVEN HARBOR, CONN.

UNITED STATES ENGINEER OFFICE,
New London, Conn., July 17, 1911.

SIR: In compliance with instructions contained in your letter of November 12, 1910, and under authority of the act of Congress approved June 25, 1910, I have the honor to submit the following report of a survey of New Haven Harbor, Conn., with a view to

Digitized by Google

improving the channel by way of Oyster Point to the bridge of the New York, New Haven & Hartford Railroad Co., on West River.

Under date of October 13, 1910, a report of a preliminary examination was submitted. In this report a general description of the section of the harbor under consideration was given. The data collected by the present survey confirms the statements made in that report as to the needs of further improvement in this portion of the harbor. A tracing showing the results of the survey is forwarded herewith.

The channel already dredged has proved a very great benefit, but it is inadequate for the present needs. As stated in the report of preliminary examination, the original channel was laid out too close to the West Haven docks, and when vessels are moored alongside these docks, as is almost always the case, they project out into the dredged channel, reducing the available width, which is already too small, by about 20 to 25 feet. As shown on the accompanying tracing, the worst place in the channel is at the turn from Mar's shipyard around past Richard's and Welsh's docks. This turn is more than a right angle, and vessels have much difficulty in navigating it—especially as the channel is entirely unmarked, except by such stakes as are placed from time to time along the bank by private individuals.

Taken as a whole, the channel has shown a very satisfactory degree of permanence. In that portion between the 16-foot anchorage basin and Oyster Point no maintenance dredging whatever has been done since the channel was first dug, and there is still available depth of fully 9 feet, although in some places it is rather narrow. There has been apparently very little filling in this portion of the channel. Along the front of Oyster Point more filling has taken place; still traces of the 9-foot contour can be found, and a draft of fully 8½ feet can probably be carried for at least 1,000 feet past the last dock at Oyster Point. From this point around to the curve above described much more filling has taken place, even more than had been supposed, so that the present available depth is probably theoretically only about 7 feet at mean low tide. However, the filling which has taken place is so soft that a vessel can work through a foot or so of it, thus increasing by that amount the available depth. The very soft nature of this fill probably accounts for the considerable variation in some of the soundings close together, as it is very difficult to tell when the rod or sounding lead touches the bottom, which is constantly stirred up by passing vessels.

When this channel was first laid out there was considerable question as to whether the current would follow it, or would flow across it and follow out through the old channel—but the result has proved that the supposition that the current would follow the new channel was correct. At the time of the survey of this portion of the harbor, made in 1902, there was a well-marked channel running from Mar's shipyard in a nearly easterly direction and to the southward of the present channel. In this natural channel there were then depths ranging from 3 feet to nearly 5 feet for a distance of nearly 2,000 feet easterly from Mar's dock. At the time of the 1908 survey this channel had filled in to a very large extent, but there were still depths of as much as 3 feet within less than 1,000 feet of Mar's dock, but at the time of the present survey this channel had practically entirely filled in, so that the area to the eastward of Mar's dock is a very nearly level mud flat, almost

Digitized by Google

bare at low tide. This shows that the greater part of the tidal current flows out through the new channel.

That portion of the channel above the Kimberly Avenue bridge dredged by private enterprise, has proved very satisfactory and surprising permanence. Although dredged only 75 feet wide and through mud flats bare at low tide, the available depth in this channel after five years is fully 7, and very likely 7½ feet. It is not believed that any change in the location of this channel or in its width except at the turn is necessary, but the depth should be increased to the same extent as may be done in the outer channel.

In accordance with the recommendations contained in the indorsement of the Board of Engineers for Rivers and Harbors on report of preliminary examination, dated October 31, 1910, the following estimates are submitted:

(*a*) To restore and maintain the present project dimensions of the portion of the channel below Kimberly Avenue:

52,500 cubic yards of dredging, at 15 cents	$7,[illegible]
Administration and inspection	[illegible]
Total cost of restoration of existing channel	8,[illegible]

To maintain existing channel below Kimberly Avenue will probably require the removal of material at the rate of about 15,000 yards per year, this being based on the amount actually removed to date and amount required to restore the channel at present to full dimensions. This dredging is estimated to cost—including the administration and inspection—about $2,500. It would probably be advisable to redredge this channel about once in three years, making the cost of maintenance about $2,500 per year, to be expended triennially.

(*b*) To restore and maintain the channel constructed by private interests between Kimberly Avenue and the railroad bridges:

28,000 cubic yards of dredging, at 15 cents	$4,[illegible]
Administration and inspection	[illegible]
Total cost of restoration of above-named channel	4,[illegible]

To maintain this channel would probably require the removal of about 5,000 cubic yards per year, at an estimated cost—including administration and inspection—of about $825. It would probably be advisable to redredge this channel about once in three years, making the cost of maintenance about $825 per year, to be expended triennially.

It will be seen from the above that the cost of restoring the present channel from the 16-foot anchorage basin, all the way up to the railroad bridge, including the portion dredged by private enterprise would be about $13,300, and to maintain these channels would cost about $3,300 annually, or about $10,000 every three years, which is about as long as the channel should go without dredging if the full project depth is to be maintained.

To restore these channels to the present project dimensions and to maintain such dimensions would not give adequate relief, for the conditions have materially changed since the project was first adopted. As stated in the report on the preliminary examination above referred to, a lift bridge was substituted for the old fixed bridge at Kimberly Avenue in 1906, thus opening to general navigation that

Digitized by Google

portion of the channel above Kimberly Avenue, and this portion of the channel is at present much used by vessels of considerable draft. The Sanderson Fertilizer & Chemical Co., The Howard Co., and the Richards Lumber Co. frequently have to split a cargo or bring it in by lighters—either of which is expensive. All claim that vessels of deeper draft would be used if depth of channel permitted it. One of the lumber firms shipping lumber to West Haven is anxious that the depth be so increased as to permit vessels laden with southern pine to go directly to the West Haven wharves. They state that it is now very difficult to get schooners to carry lumber which do not draw at least 17 or 18 feet, and of course such vessels could not reach the wharves through the present channel, even were it restored to full project depth.

In the latter part of May a new steamboat line was established, running between New Haven and Port Jefferson, L. I., and landing at the dock on the west side of the channel, immediately below the Kimberly Avenue Bridge. The company operating this line is known as the Long Island Navigation Co., and the steamer is the *Elm City*. She is a vessel about 118 feet long, 27-foot beam, and is said to draw about 8 feet, but employees connected with this office have frequently seen her drawing 9 feet. This vessel will make from one to two trips daily between New Haven and Port Jefferson during the summer, carrying passengers and freight, and during the winter will run to New York, carrying freight only. Her power consists of two internal-combustion, gas-producing engines. Up to the present time she has had much difficulty in getting back and forth through the channel—so much difficulty that for the past few weeks it has been customary to take her out and in in tow of a tug, as it was not considered practicable to operate her under her own power. A letter from the president of the company in regard to this boat is inclosed.

For the reasons above stated it seems that the channel should be deepened to 12 feet at mean low water. This would make the channel available at all times for the ordinary run of coal barges, for the Port Jefferson boat above described, and for most of the vessels using the channel. The deep-draft lumber schooners would, of course, have to wait for high tide. With a depth of 12 feet at mean low water, schooners of 17 or 18 feet draft could reach the docks at high tide, the mean rise and fall of the tide being about 6 feet. This same depth should be extended up through that portion of the channel above Kimberly Avenue to the railroad bridge. As stated above, the present channel is too close to the West Haven docks, and the westerly line of the channel should be kept at least 30 feet from these docks; and in order to give the larger vessels which now use it, and which are expected to use it, room to make the turns, the turn opposite the first dock at Oyster Point should be widened, and also the turn opposite Mar's shipyard and from there on up to the Kimberly Avenue Bridge, all as shown on the accompanying map. The present width of the channel above Kimberly Avenue is considered sufficient, with the exception of the turn near the head, where one section should be increased in width 25 feet as shown on map.

At present there is a considerable number of small pleasure and fishing boats which are owned by people in West Haven which

Digitized by Google

use this channel, but there is no place where these small crafts can anchor without obstructing the channel and being in danger of being run down by passing vessels, unless they anchor out on the mud flats where they are aground at low tide, which is of course very inconvenient. In order to provide for these small crafts, both for their own convenience and to keep them out of the way of the larger vessels, a small anchorage basin should be provided, the location of which is indicated on the accompanying tracing. This basin should be dredged only to a depth of 6 feet, as this is amply sufficient for the small craft, and it would have the advantage of keeping the larger vessels out of it.

While considering the advisibility of the improvement of this channel, attention is respectfully invited to the report of the commerce statistics of this portion of the New Haven Harbor forwarded herewith. It will be noticed that the entire tonnage passing through the channel amounted during the past current year to 162,568 short tons valued at over $1,200,000. This is the largest tonnage which has been reported for this portion of the harbor, and shows an increase of nearly 25 per cent over the previous year. The tonnage above Kimberly Avenue Bridge increased about 40 per cent, that at the West Haven docks decreased very slightly, and that at Oyster Point increased over 50 per cent. All other channels in New Haven Harbor, with the exception of the temporary channels between Ferry Street and Grand Avenue in the Quinnipiac River, are at least 12 feet deep at mean low water.

After the Government has once undertaken to dredge channels through mud flats or in small tidal tributaries the point at which such dredging should terminate is hard to select. In the case under consideration, inasmuch as 40 per cent of the traffic using the channel uses that part of the channel above Kimberly Avenue Bridge, it is believed that the parties using this part of the channel which was extended by private funds are entitled to as much consideration as those below the Kimberly Avenue Bridge—in fact, it is believed that since they have done some of the dredging at their own expense they are entitled to have deep water carried up to their wharves. It is believed that the channel by way of Oyster Point to the bridge of the New York, New Haven and Hartford Railroad Company in West River ought to be dredged to a depth of 12 feet at mean low water to provide a channel, as shown on the accompanying drawing, and that an anchorage basin for small boats should be provided having a depth of 6 feet at mean low water.

(c) The estimated cost of doing this work is as follows:

	Cubic yards
Portion of channel below Kimberly Avenue Bridge	261,000
Portion of channel above Kimberly Avenue Bridge	73,000
	334,000
6-foot anchorage basin with area of about 1.28 acres, as shown on accompanying map	16,000
	350,000

350,000 cubic yards, at 13 cents	$45,500
Administration, inspection, etc	4,500
Total estimated cost	50,000

Digitized by Google

It is estimated that it would require dredging at the rate of about 24,000 yards per year—6,000 yards above Kimberly Avenue and about 18,000 below Kimberly Avenue—to keep a 12-foot channel in good condition. This dredging, at the rate of 15 cents per yard, would cost about $4,000 per year. It would probably be advisable to redredge this channel about once in three years. The amount estimated for maintenance, $4,000, is about one-third of 1 per cent per annum of the estimated value of the freight carried through these channels.

On the accompanying map the present channel, dredged by the Government, is indicated by broken lines. The space covered by section lines indicates the points where it is considered advisable to depart from the present project.

I have the honor to recommend that the channel by way of Oyster Point to the bridge of the New York, New Haven, & Hartford Railroad Co., on the West River, be dredged to a depth of 12 feet at mean low water and that a 6-foot anchorage basin for small boats be provided, all in accordance with plan exhibited on accompanying drawing.

Very respectfully, your obedient servant,

A. E. WALDRON,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, July 22, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views and recommendations of the district engineer officer.

S. W. ROESSLER,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 8, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

In its indorsement of October 31, 1910, on the report of preliminary examination of this locality, the board recommended that a survey be authorized and that certain estimates be furnished by the district officer. These estimates, given more in detail in the within report, are as follows:

(a) Restoring channel below Kimberly Avenue Bridge to present project dimensions	$8,675
Annual cost of maintenance	2,500
(b) Restoring channel constructed by private interests between Kimberly Avenue and the N. Y., N. H. & H. R. R. bridges	4,625
Annual cost of maintenance	825
(c) Deepening to 12 feet at mean low water the existing channel up to the N. Y., N. H. & H. R. R. bridge, with varying widths as indicated on the accompanying map, and dredging 6-foot anchorage basin for small craft	50,000
Annual cost of maintenance	4,000

Digitized by Google

On account of the difficulties attending the navigation of the 9-foot channel of the existing project, and the need for greater depth and width to accommodate vessels suited to the commerce of the locality the district officer believes that the restoration of the channel to present project dimensions would not give adequate relief. The improvement covered by estimate C is designed to meet the present needs of navigation, and is recommended by the district officer for adoption. The 6-foot anchorage basin is intended for the convenience of small craft and to provide a place where they can anchor without obstructing the channel and without risk of being run down by passing vessels. The part of the channel above Kimberly Bridge which was dredged at private expense, is now of general commercial interest and its enlargement and maintenance by the United States appear to be desirable and proper.

The information presented by the district officer seems to establish the fact that the existing channel is too shallow and at places too narrow for the proper handling of traffic. The project proposed by him will remedy these conditions at a cost not disproportionate to the commerce involved and the benefits which the work will confer. The board therefore concurs with the district officer and division engineer in recommending that the project for improvement of this locality be modified to include the work covered by estimate C at a first cost of $50,000 and $4,000 annually for maintenance. The full amount of the estimate should be provided in one appropriation.

Wharves and terminal facilities are discussed in the report on preliminary examination. In compliance with law, the board reports that there are no questions of waterpower or other related subjects having any bearing upon the improvement of navigation at this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

LETTER OF THE LONG ISLAND NAVIGATION CO.

NEW HAVEN, CONN., *June 9, 1911*

DEAR SIR: Confirming recent conversation regarding steamer *Elm City*, I beg to say that this vessel is enrolled under certificate No. 31, and is a gas screw of 1[illegible] feet length, 27 feet breadth, and 11.3 feet depth. Her gross tonnage is 379 tons and her tonnage 249 tons. She will make daily trips from New Haven to Port Jefferson carrying passengers and freight under the command of Capt. L. W. Tryon, and has official No. 208668 and letters "L. B. S. D." We expect that she will make one daily trip up to June 19, and will probably make two trips a day from that time on, until late fall when she will run from New York to New Haven, using the same dock most of the time. You will find that it is impossible with the present channel to take the vessel out without towing her with the tug, as the channel is not wide enough or deep enough to handle her. We use circulating pumps for cooling her engines and washing our gas, and we are unable to start these pumps as the intake is practically blocked with mud.

I understand that you are going to submit this report to Washington regarding the channel, and we should like very much to have you incorporate in your reply some suggestions to the effect that—

First. The corner of the channel opposite Richards Dock should be cut off so that the vessel can get out of this right angle without difficulty. If there is a schooner lying at Richards Dock, as there is at the present time, it is almost impossible to avoid hitting her, and as a matter of fact last night in coming in the *Elm City* did strike the

Digitized by Google

chooner, doing some little damage. The same situation prevails off Smith's oyster ock, but not to so serious an extent. Off that dock if there is a steamer lying at the nd of the dock, as there generally is when we come in at about 5.30, it is very hard to et by her and not get on the edge of the channel and get ashore. At this point we ould suggest, if possible, that the channel be widened a little.

Second. The channel is filled in from Richard's Dock to the black channel buoy o that there is but 7½ feet at low tide, and our vessel draws 8 feet aft and 7 feet 2 orward. I presume that you will incorporate in your report some suggestions as to he deepening of this channel. The worst feature is the right angle turn off Richard's Dock, and we think that that should be a broad curve cutting the angle back at least 00 feet, which would enable us to pass a vessel at Richard's Dock in safety. We nderstand that there is an appropriation for this work and that the Government is imply awaiting your report, so we wish to urge these improvements to the channel pon you as a public necessity and convenience and shall greatly appreciate anything ou can do to assist us along the line indicated above.

Yours respectfully,

LUCIEN SANDERSON, *President.*

MR. G. E. VERRILL, *Assistant Engineer.*

COMMERCIAL STATISTICS.

Receipts and shipments.

[Commercial statistics for calendar year 1910.]

OYSTER POINT.

Articles.	Short tons.	Valuation.
Coal	1,566	26,950.00
Oysters	48,641	657,114.60
Oyster shells	35,697	75,279.80
Total	85,904	739,344.40

BELOW KIMBERLY AVENUE BRIDGE.

Coal	37,203	$156,341.50
Lumber	3,920	79,059.29
Total	41,123	235,400.79

ABOVE KIMBERLY AVENUE BRIDGE.

Coal	12,352	$50,979.60
Lumber	1,701	24,742.23
Sand	2,947	3,452.79
Clay	8,134	15,194.06
Brick	112	1,153.68
Cement	458	3,877.50
Plaster	685	3,935.15
Fertilizer (raw and manufactured)	5,227	111,926.00
Phosphate rock	2,016	13,500.00
Stone	856	3,786.33
Miscellaneous	1,053	3,364.78
Total	35,541	235,911.12
Total for entire channel	162,568	1,210,656.31

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

2D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 536.

NANTUCKET SOUND, MASS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF PRELIMINARY EXAMINATION AND SURVEY OF NANTUCKET SOUND, MASS.

FEBRUARY 13, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, February 12, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 10th instant, together with copies of reports from Lieut. Col. J. C. Sanford, Corps of Engineers, and a special board of Engineer officers, dated November 16, 1909, and November 21, 1911, with maps, on preliminary examination and survey, respectively, of Nantucket Sound, Mass., made in compliance with the provisions of the river and harbor act of March 3, 1909.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 10, 1912.

SIR: I have the honor to submit herewith for transmission to Congress, reports dated November 16, 1909, by Lieut. Col. J. C. Sanford, Corps of Engineers, and November 21, 1911, with maps, by a special board of Engineer officers, on preliminary examination and survey,

Digitized by Google

respectively, prepared in compliance with a provision of the river harbor act of March 3, 1909, as follows:

Nantucket Sound [Mass.], with a view to the removal of the northerly e Stone Horse Shoal and of such portions of Bearse Shoal and Pollock Rip S may be necessary.

The improvement desired by navigation interests, and in w much interest has been manifested and which will be of unus great value to navigation if secured, is a straight channel no than 1 mile wide and 30 feet deep at low water from the Handker Light Vessel, about 5½ miles southwest of Monomoy Lighth extending northeastward to the whistling buoy near the pr northern entrance to the Pollock Rip Slough, to replace the pr crooked and in places narrow and dangerous Pollock Rip Cha

Because of the mobile character of the material on the bottom the exposed location of the channel it has been impracticable to at this time a reliable estimate of cost of the desired improve Noting that one or more Government-owned dredges adapted to class of work will probably be available within the next year or so board suggests the use of such plant in affording relief at dang localities, particularly in the vicinity of Shovelful Lightship, w any widening of the channel will be immediately beneficial to merce. From such a practical test the most advantageous and nomical methods of carrying out the work desired, as well as its pr able cost, can be more definitely determined. The board recomm for such a test an appropriation of $250,000, and considers that such work has been done as can be done for that sum the advisab of further work should receive consideration, and that the fact sh be made plain in the act of appropriation that the United States is committed to a continuance of the improvement beyond such te

These reports have been referred, as required by law, to the Bo of Engineers for Rivers and Harbors, and attention is invited to t board's report herewith, dated December 19, 1911, concurring in views of the special board.

After due consideration of the above-mentioned reports I concur the views of the special board and the Board of Engineers for Riv and Harbors, and therefore in carrying out the instructions of C gress I report as follows: That the improvement by the United Sta of the north or Pollock Rip Channel through the shoals lying near entrance to Nantucket Sound, by the use of an available Governme owned plant under a single cash appropriation of $250,000, is advisa in order to enable a more definite determination to be made as to w amount of additional work of improvement is advisable. It is a considered advisable that the act of appropriation should make cl the fact that this improvement is only in the nature of a test, u the results of which the extent of improvement justified is to determined.

The vicinity of the proposed work is shown on Coast and Geod Survey Chart No. 111.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

Digitized by Google

PRELIMINARY EXAMINATION OF NANTUCKET SOUND, MASS.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 16, 1909.

SIR: In compliance with department instructions dated March 9, 1909, I have the honor to submit the following report on the preliminary examination of the following locality, as required by the river and harbor act of March 3, 1909: "Nantucket Sound [Mass.], with a view to the removal of the northerly end of Stone Horse Shoal and of such portions of Bearse Shoal and of Pollock Rip Shoal as may be necessary."

The numerous and extensive shoals lying eastward and southeastward of the eastern entrance to Nantucket Sound and southward and eastward of the southeasterly elbow of Cape Cod, constitute probably the greatest danger to navigation to be found on any of the coastwise routes of the Atlantic coast of the United States north of Hatteras. In view of the numerous vessels passing around these shoals they are probably a greater menace to navigation than Hatteras. Their dangerous character is shown both by the large number of wrecks annually occurring there and by the large number of light vessels and other aids to navigators traversing the shoals.

From Nantucket Sound to the ocean two channels lead through the shoals. The north or Pollock Rip Channel is the most used, as it is shorter, is somewhat protected from easterly storms by the shoals outside it, and is closer to the shore; but it is quite circuitous and narrow in places and the tidal currents are strong and varying in direction. The second or south channel leads through the shoals in a nearly due east direction from Nantucket (Great Point) Lighthouse. It is somewhat deeper than the Pollock Rip Channel and much wider, but is not so direct for coastwise vessels and carries a vessel much farther from the shore. This channel is considered in the United States Coast Pilot for the Atlantic coast as the dividing line between Nantucket and Monomoy Shoals, the shoals lying to the northward of the channel being called the Monomoy Shoals, while those to the southward are called the Nantucket Shoals. The following description of the Monomoy Shoals in general, and of the shoals particularly named in the river and harbor act, with others lying along the course of the proposed improvement, is taken from the above publication:

Monomoy Shoals consist of numerous detached shoals of a shifting character with 3 to 18 feet over them, extending about 5½ miles in an easterly and 9½ miles in a southerly and south-southeasterly direction from Monomoy Point. Many parts of these shoals, separated from others by narrow slues, have special names and are briefly described below.

Bearse Shoal is the western and Pollock Rip the eastern part of the shoal extending from three-eighths mile to 3¾ miles eastward of Monomoy Lighthouse. These shoals consist of a series of sand shoals and sand ridges, with 4 to 18 feet over them and deep water between them. The northeastern and southeastern extremities of these shoals lie 4 miles and 3¾ miles ENE. ⅛ E. and SE. by E. ⅛ E., respectively, from Monomoy Point Lighthouse.

Broken Part of Pollock Rip, with depths of 15 to 18 feet over it, lies eastward of Pollock Rip, and is separated from it by Pollock Rip Slue, which has a width of about one-half mile and depth of 3½ to 6 fathoms.

Twelve Foot Shoal, southward of the broken part of Pollock Rip, has 14 to 18 feet over it and lies 5½ miles SE. ¼ E. from Monomoy Lighthouse.

Stone Horse Shoal, Little Round Shoal, and Great Round Shoal are portions of a continuous series of sand shoals and sand ridges with depths of 5 to 18 feet over them,

Digitized by Google

lying directly eastward of the entrance of Nantucket Sound and between the two main channels. Stone Horse Shoal and Little Round Shoal lie on the south side of the deep-water channel between them and Pollock Rip. Great Round Shoal lies from 6 to 9½ miles in SSE. direction from Monomoy Point Lighthouse; southward and eastward of this shoal for a distance of about 2½ miles there are numerous shoal spots with depths varying from 17 to 18 feet over them.

Shovelful Shoal, extending three-fourths mile southward from Monomoy Point, is bare in places and rises abruptly from the deep waters of Butlers Hole.

Handkerchief Shoal is the extensive shoal, with from 3 to 18 feet over it, lying southwestward of Monomoy Point. It is about 4½ miles long north and south, and its greatest width is about 2 miles. Its southern end, which rises abruptly from a depth of 8 fathoms to 10 feet, is about one-half mile northward of Handkerchief Shoal light vessel and 5½ miles SW. ¾ W. from Monomoy Point Lighthouse, and is marked by a buoy (nun, red, No. 10). Its northern end rising gradually from 3½ fathoms to 15 feet, lies about 3 miles WNW. ½ W. from Monomoy Point Lighthouse, and is marked by a buoy (spar, black, No. 3). On the eastern edge of the shoal are three buoys, which mark the edge of the narrow channel between it and Shovelful Shoal and Monomoy Point.

No previous preliminary examination of this locality with a view to its improvement has ever been made.

What is desired by those interested in the improvement is the replacement of the present north channel by a straight channel extending from the Handkerchief Shoal Light Vessel in an east-northeasterly direction to the northeast whistling buoy, which lies northerly of the present northern entrance to the Pollock Rip Slue Channel, as shown on a small chart issued by the American Association of Masters, Mates, and Pilots, Volunteer Harbor No. 4, with printed description and arguments. The width shown on the above-named chart is seven-eighths of a nautical mile, and the depth desired is stated to be not less than 25 feet at mean low water. The present course eastward from the Handkerchief Light Vessel is NE. by E. ½ E. to the Shovelful Shoal Light Vessel, about 5 nautical miles; thence ESE. ¼ E. to the Pollock Rip Light Vessel about 3⅝ miles; thence N. by E. ¾ E. to Pollock Rip Shoal Light Vessel 4¾ miles, passing at a distance of about 2⅞ miles the northeast whistling buoy. The angles in the course at the Shovelful Light Vessel and the Pollock Rip Light Vessel are about 56° 15′ and 95° 37½′, respectively.

The arguments presented for the proposed improvement are many, being based mainly upon the large amount of commerce traversing the locality, the dangers to which this commerce is exposed, and the lessening of these dangers by the proposed channel, and upon the belief that the channel could be dug and maintained at a comparatively small expense, in view of the great improvements made in recent years in dredging on ocean bars, and particularly the small cost per cubic yard of the dredging now being done in the Ambrose Channel, N. Y. Each of these subjects will be examined in turn.

PRESENT AND PROSPECTIVE COMMERCE.

As it is not considered safe for vessels drawing more than about 21 feet to attempt to pass through the north passage, such vessels are now obliged to take the south channel, but Nantucket Sound can not be easily traversed by vessels having a greater draft than 27 feet (see Atlantic Coast Pilot, Pt. III, p. 84), and it is not thought that vessels drawing upward of 25 feet often pass through the Sound. For this reason, it is believed that with the construction of the proposed channel the pre[illegible]annel would be very little used.

Digitized by Google

ence, the statistics of both channels are taken together as indicating ıe probable amount of use of the proposed channel in case no other 'tificial channels between Boston and Long Island Sound were ›nstructed.

The Board of Engineers appointed under the river and harbor act ' June 13, 1902, to make an examination of the relative merits for ırbors of refuge for all proposed or available localities on the south ıd southeast coast of Rhode Island and Massachusetts stated in ıeir report, dated December 2, 1903 (printed in H. Doc. No. 60, 58th ong., 2d sess.), that—

> The number of vessels following the route through Vineyard and Nantucket Sounds ıd along the eastern shore of Cape Cod is estimated to be annually upward of 50,000. Practically all of this commerce passes Cape Cod.

The number of vessels now passing the Cape, however, is believed › be considerably less than this, though the average tonnage is onstantly increasing. Reports of the keepers of the Pollock Rip hoals Light Vessel, of the Great Round Shoal Light Vessel, and of ıe Shovelful Shoal Light Vessel, kindly furnished me by Capt. W. G. utler, United States Navy, inspector second lighthouse district, ıdicate that the total number of vessels of all kinds passing the hoals by both passages in the year August 1, 1908, to July 31, 1909, ras 22,841, of which 3,638 were steamers, 3,291 tugs, 8,907 sailing essels, and 7,005 barges. Comparing these figures with the statistics or Boston Harbor for the calendar year 1907, it would appear that a onsiderable portion of the sailing vessels given are fishing vessels. 'he arrival and departure of coastwise vessels at Boston in that 'ear (printed in Annual Report of the Chief of Engineers for 1908, 't. I, p. 958) are as follows:

Class.	Number.	Gross tonnage.	Average tonnage.
teamers	4,496	9,954,864	2,214
ailing vessels[1]	2,918	2,432,230	834
ugs	4,606	1,398,230	304
arges	7,212	6,737,604	934
Total	19,232	20,522,948	.....

[1] Excluding fishing vessels.

It will be noted from this table that the total number of tugs and barges is about four times that of sailing vessels. Comparing these figures with those of former years, the change in proportion of the different classes of vessels is noteworthy. In 1902 steamers comprised 20.5 per cent; tugs, 18 per cent; sailing vessels, 24 per cent; and barges, 37.5 per cent. In 1906 the steamers comprised 20.3 per cent; tugs, 20.6 per cent; sailing vessels, 15.8 per cent; and barges, 43.3 per cent. The above figures for 1907 show steamers, 23.4 per cent; tugs, 23.9 per cent; sailing vessels, 15.2 per cent; and barges, 37.5 per cent. A comparison of cargo carried by water to Boston in 1899 and 1905, made by Mr. William Barclay Parsons, chief engineer of the Boston, Cape Cod & New York Canal Co., shows that of the total tonnage carried to Boston in 1899, 53.9 per cent went in steamers and exactly the same in 1905; but, while barges carried but 21.1 per cent in 1899, they carried 31.3 per cent in 1905, and the sailing-vessel

Digitized by Google

tonnage, which accounted for 25 per cent of the whole in the first y had fallen to 14.8 per cent in the second.

The total amount of cargo passing through the shoals can only approximated. In 1907 it was estimated by Mr. Parsons that amounted to 12,000,000 tons of coal and 6,000,000 tons of other co modities. During the same year the total receipts of coal at all N. England ports north of Cape Cod which were under improvement the Government and which included all ports of importance, amoun to 9,812,911 tons (of 2,000 pounds), all of which, it is believed, pa through these shoals. Definite figures as to other commodities do exist, but it is believed that 6,000,000 tons is a fair estimate.

The future amount of commerce using this route is largely depe ent upon the effect of the construction of new artificial routes for purpose of enabling the passage around Cape Cod to be avoided. of these, the Cape Cod Ship Canal, is now under construction, an is expected by the company constructing it that it will be comple in about three years. Another is the proposed inland waterw between Boston and Long Island Sound via Narragansett Bay and inland route in southern Rhode Island, for which a survey and e mate are ordered by the river and harbor act of March 3, 1909. is the expectation of the Boston, Cape Cod & New York Canal Co. on the completion of their canal all coastwise steamers, tugs, a barges will use the canal instead of passing around the Cape, and sailing vessels will also use it under certain weather conditions. T expectation, so far as steam vessels and barges are concerned, appe to be justifiable provided sufficiently low rates of toll on the canal fixed. As to sailing vessels, what the effect will be is somewhat pr lematical. As the canal will shorten the distance between New Y and Boston about 67 miles, there is some question whether, on completion of the canal, sailing vessels will be able to continue th competition in the carrying of coal with tugs and barges, and this depend largely on whether the tolls are fixed close to the maxim amount that tugs and barges can afford to pay or whether they made much lower. In any case it is fair to assume that after completion of the canal the total traffic around Cape Cod will be, i marked degree, reduced. The effect of the construction of an int coastal waterway from Boston to New York via Narragansett B would be to induce the substitution of lighter barges, more chea built and operated, and suited only to inland navigation, for expensive seagoing barges necessary for navigation around Cape or via the Cape Cod Canal, and the development of the inland ro would reduce somewhat proportionately the present coastwise co merce carried on in sailing vessels.

DANGERS TO NAVIGATION.

The dangers to which navigation is exposed in Vineyard and Na tucket Sounds and in passing through the Monomoy Shoals are in cated by the following quotations from the Atlantic Coast Pilot:

The numerous shoals, strong tidal currents, at certain seasons thick fog, and large number of sailing vessels there often encountered beating through the nar parts of the channel, call for more than the ordinary attention of the navigator. T strongest currents will be encountered in Pollock Rip Slue, between the Handkerc and Pollock Rip Light Vessels, off East and West Chops, and in Vineyard Sou In some cases the current sets directly on the shoals and in a calm sailing vessels sometimes obliged to anchor to prevent getting aground.

Digitized by Google

Statistics as to wrecks which have been removed by the Government give a very good idea as to the dangerous character of the shoals and as to the causes of shipwreck.

Between 1885 and June 30, 1909, 154 wrecks were removed by this office. They consisted of 8 steamers, 2 barkentines, 1 brig, 110 schooners, 19 barges, and 21 unknown. The unknown vessels were large pieces of wreckage forming obstructions, but so far broken up as to have lost their identity. Of the 154 wrecks, 54 were from the Monomoy Shoals (north passage) and are classified as follows: Five steamers, 1 barkentine, 40 schooners, 7 barges, and 1 unknown.

The causes of the 154 wrecks were: Collisions, 35; struck shoals and sank, 19; driven ashore or foundered in gales, 40; burned 9; unknown causes, 51. The causes of the 54 wrecks on Monomoy Shoals (north passage) were: Collisions, 19; struck shoals and sank, 13; gales, 10; burned, 1; unknown causes, 11.

Between the years 1880 and 1903 there are records in this office of 188 marine disasters on the Monomoy Shoals (north passage), not always, however, resulting in complete loss.

The 188 were: One ship, 2 brigs, 2 barkentines, 169 schooners, 2 sloops, 2 steamships, 1 steam yacht, 2 schooner yachts, 7 barges. Of the 154 wrecks removed, only 1 was in the south passage between Monomoy and Nantucket Shoals.

The length of that portion of the principal sailing route from New York to Boston on or near which the above 154 wrecks were removed is 98¾ miles, and the length of the north passage through Monomoy Shoals is 13¾ miles, the latter length being 13½ per cent of the total length. The percentage of wrecks removed in the north passage is, however, 35. Since June 30, 1909, 4 additional wrecks, consisting of 2 schooners and 2 barges, have been removed or reported for removal. The two schooners were wrecked in Vineyard Sound and Nantucket Sound, respectively, due to striking shoals. The two barges were wrecked on Monomoy Shoals, one of these being caused by collision with a steamer and one by striking on a newly formed and unmarked shoal.

The main dangers of passing through the Monomoy Shoals by the present north passage, and which the proposed improvement, it is claimed, would lessen, are due principally to the following, taken in connection with the great number of vessels passing: Narrowness and tortuousness of channel, fog, tidal currents, adverse winds.

Narrowness and tortuousness of channel.—The present channel, from the Handkerchief Shoal Light Vessel to the northeast whistling buoy on the three courses above described, varies greatly in the different parts with regard to the width and depth. The narrowest part of the section from the Handkerchief Shoal Light Vessel to the Shovelful Shoal Light Vessel for a depth of 21 feet is about 3,600 feet near its northeastern end, while at the southwestern end there is practically no limit to its width on the southeastern side, the Handkerchief Shoal approaching it closely, however, on the northwestern side. On the course from the Shovelful Shoal Light Vessel to Pollock Rip Light Vessel the minimum width for 21 feet depth is 3,600 feet and the average width about 5,700 feet. For the section through Pollock Rip Slue from Pollock Rip Light Vessel to the northeast whistling buoy the minimum width for 21 feet depth is about 2,000 feet and the average width 3,200 feet. At the northern entrance of Pollock

Digitized by Google

Rip Slue the shoal on the east, known as the broken part of Pol Rip, has within the past year been found to have advanced in marked degree westwardly, so that the bell and gas buoys mark the entrance have had to be moved 1,200 feet to the west, thus pla them practically on the sailing course.

The most dangerous points in the sailing course appear to be turn at the Pollock Rip Light Vessel and the narrow passage thr Pollock Rip Slue. So far as straightness is concerned, the prop channel would be a marked improvement on the present one, larg diminishing the chances of collision in the narrow channels and at turns.

Fogs.—The statement is made by the American Associatio Masters, Mates, and Pilots, Volunteer Harbor No. 4, that fogs more prevalent here than on any other part of our coast. It been impossible for me to verify this, but I think it may be assu that fogs here interfere with more vessels than on any other pa our coast. The following statement furnished me by Capt. W Cutler, United States Navy, inspector second lighthouse dist gives the hours of fog for the fiscal years 1906 to 1909 at the Po Rip and the Great Round Shoal Light Vessels:

Pollock Rip Light Vessel, No. 47:	
1906	
1907	
1908	
1909	
Average hours per year	
Great Round Shoal Light Vessel, No. 42:	
1906	
1907	1
1908	1
1909	1
Average hours per year	

As to the time of year and direction of wind in which fogs are m frequent in this locality, the Atlantic Coast Pilot says:

> Fogs are liable to occur at any time, but are more frequent from April to O than during the remainder of the year. They come very frequently with the ea and southerly winds; northerly winds carry them away.

Probably a majority of the disasters on these shoals have occu during fog. Collisions are generally due to the narrowness of channel, particularly in Pollock Rip Slue, to the sharpness of turns, and to the large number of steamers and tows passing thr in thick weather.

Were the steamers and tows to cease using this channel, as expected on the completion of the Cape Cod Canal, the danger sailing vessels from collision would be reduced to a small par what it is at present. Under present conditions it would also greatly reduced if all sailing vessels were to use the main or so passage via the Great Round Shoal Light Vessel, by which the r from New York to Boston is lengthened by only about 12 miles.

Tidal currents.—Regarding these the Atlantic Coast Pilot spe as follows:

> Northward of Pollock Rip the general set of the flood is eastward of northeast of the ebb a little westward of southwest. The current sets in all directions

Digitized by Google

mpass during the 12 lunar hours without ever being at rest, turning from north to st and from south to west (with the hands of a watch). About 4 miles is the greatest elocity observed. This was on the rips eastward of Nantucket Island. About 3 ours after the currents turn they attain their greatest velocity.

Eldridge's Tide and Current Book, 1894, states that at Pollock Rip ight Vessel the flood current at the time of its greatest velocity runs om west-southwest to west; the ebb current from east-northeast to ast. The force and direction of the current is greatly altered by trong long-continued winds.

Eldridge's chart gives for a point about one-half mile west by south f the Northeast Whistling Buoy an average velocity for the ebb of ½ miles and for the flood 1½ miles, which is about the same as given y him in the wider part of Nantucket Sound and is much less than or the narrower portions of Vineyard Sound. The greatest danger lue to these currents appears to be from the fact that they vary onstantly in direction and frequently tend to set vessels on the shoals. This danger would probably be lessened by the proposed channel, oth on account of its direction and width.

Adverse winds.—Records showing the maximum velocity of wind and the direction of this maximum velocity for each day of the alendar years 1901, 1902, and 1903 at the observing station of the United States Weather Bureau at Nantucket, Mass., have been furnished me by the kindness of Mr. George E. Grimes, official in charge, this being the nearest station of the Weather Bureau to the Monomoy Shoals. From these records the following tables have been compiled:

Digitized by Google

TABLE I. *Number of days upon which the strongest winds were from the several points of the compass at Nantucket in 1901 and 1903, also the mean of the maximum velocities, in miles per hour, on these days.*

	South.		Southwest.		West.		Northwest.		North.		Northeast.		East.		Southeast.	
	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.
For 3 years	113	21	187	21	133	25.8	205	27.9	124	27.8	154	24.7	60	34.5	119	25.9
For 1 year	37⅔	.....	62⅓	.....	44⅓	.....	68⅓	.....	41⅓	.....	51⅓	.....	20	.....	39⅔	.....

TABLE II.—*Total maximum movement of wind, 1901–1903, from the several directions.*

[Product of the two columns under each point in Table I.]

	South.	Southwest.	West.	Northwest.	North.	Northeast.	East.	Southeast.
or 3 years	2,373	3,927	3,431	5,719	3,447	3,804	2,170	3,062

TABLE III.—*Same as Table I, but classified by summer and winter months.*

	South.		Southwest.		West.		Northwest.		North.		Northeast.		East.		Southeast.	
	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.	Number of days.	Mean of maximum velocities.
May 1 to Nov. 1	73	18	123	19.9	41	20.9	56	25.7	60	25.5	94	22.4	22	28.0	73	22.7
Nov. 1 to May 1	40	26	54	22.7	92	27.9	149	29.0	64	29.9	60	26.5	38	38.3	46	31.1

Digitized by Google

TABLE IV.—*Number of days upon which velocity exceeded 40 miles per hour, and maximum velocity.*

	South.		Southwest.		West.		Northwest.		North.		Northeast.		East.		Southeast.	
	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.	Number of days.	Maximum velocity.
May 1 to Nov. 1	.....	.....	.....	.....	.....	.....	1	42	6	46	3	48	6	48	2	48
Nov. 1 to May 1	3	50	1	55	12	48	17	49	12	56	13	54	13	68	12	47

TABLE V.—*Number of days upon which velocity might be expected to exceed 40 miles per hour.*

	South.	Southwest.	West.	Northwest.	North.	Northeast.	East.	Southeast.
Nov. 1 to May 1	1	½	4	5½	4	4½	4½	4
May 1 to Nov. 1	.....	.....	.....	½	2	1	2	½

Digitized by Google

The first table shows that the most frequent winds are from northwest, and that the mean velocity for these winds is high, b exceeded only by that of the east wind. The preponderance of w in this direction is well shown in the second table. From the th table it appears that the prevailing summer wind is the southw but that it is comparatively light, and that the prevailing wi wind is the northwest, with a considerable average force. greatest number of storm winds, as shown in Table IV, is from east, which direction also shows the greatest velocity. The num from the north and northwest is, however, nearly as great, tho the maximum velocity is less in each case. The marked differ in the number of storms between the summer and winter month well shown by this table and Table V. The argument has been m that the proposed channel lies in a location more advantageous sailing vessels than the present channel. As the direction of proposed channel lies nearly northeast and southwest, it appear be disadvantageous for a sailing vessel bound east in a northe wind, which is one of the winds most dreaded on this coast, from fact that the wind often remains from the northeast for several d together, and is, consequently, accompanied by heavy seas, and because it is almost always accompanied by thick weather. Fo vessel bound to the westward in a southwest wind, which is the p vailing summer wind on these shoals, the position of the prop channel also appears disadvantageous. On the whole, I can see decided advantage for sailing vessels in point of direction of the p posed channel over the present channel, though the proposed char has undoubtedly marked advantages in the way of straightness a width.

COST OF CONSTRUCTING AND MAINTAINING PROPOSED IMPROVEME

Letters and printed matter received indicate a belief on the pa of the writers that the proposed channel involves a very small amou of dredging. One of them states that it "gives a working chann with a minimum of dredging; in fact, is almost a natural channe.

The description issued by the American Association of Master Mates, and Pilots, Volunteer Harbor No. 4, contains the followin

> In the proposed channel there is at present a little more than a mile where depth of water ranges from 14 to 20 feet, the balance being a natural channel, w depths from 4½ to 8 fathoms, obstructed only by the lumps north of Stone Hor Shoal, which at present have a depth of 21 feet.

The above fairly states the present conditions except as to certa depth figures. There is now a natural channel between Pollock R Shoal and Bearse Shoal having a least depth of about 3¼ fathoms and second narrower and shallower channel through Pollock Rip Sh parallel to it, both being within the limits of the proposed chann The chart does not give the depths in the second channel mentione The least depth on Pollock Rip Shoal within the limits of the pr posed channel is given on the chart as 12 feet. The lumps north Stone Horse Shoal, as shown on the chart, consist of four sma lumps and a narrow shoal about one-third of a mile in length, th least depth on the latter, as shown on the chart, being 12 feet. I spite of the fact, however, that much of the proposed channel is, a stated, a natural channel, a very considerable amount of dredgin

Digitized by Google

would be required to secure the width and depth desired. No Government hydrographic survey of this locality having been made by the United States Coast and Geodetic Survey since 1906 (possibly not since 1902) the latest chart furnishes only a very approximate idea of the amount of dredging that may be required. (For example, the 1900 chart, the latest hydrography on which is of 1899, shows a depth of 14 fathoms. The latest chart, on which corrections to hydrography to 1906 are made, shows a depth at the same point of 18 fathoms. At another point where the 1900 chart shows 4¼ fathoms the latest chart shows 8½ fathoms.)

On this latest chart the amount of material shown above the 26-foot plane is between 15,000,000 and 20,000,000 cubic yards, the few soundings allowing only a very rough calculation to be made. The amount of back fill during the work I should expect to be large. Costly seagoing suction dredges would have to be constructed for this greatly exposed work. The material is believed to be sand only. The above statements are made for the purpose of indicating only that the work can not be done at so low a cost as seems to be believed.

The question as to the possibility of maintaining at a reasonable cost the channel when constructed appears in this case to be of much greater importance than in the usual case. The shoals are undoubtedly of a shifting character. A comparison of Coast Survey charts issued from 1860 to the present time shows enormous changes in the channels and in the shape and position of the various shoals.

On the chart of 1860 the principal passage from Butlers Hole (deep water southwest of Shovelful Shoal Light Vessel) to the ocean was due east from Pollock Rip Light Vessel through a 5-fathom passage south of the broken part of Pollock Rip. The chart of 1874 shows this passage closed by the 5-fathom contour, which is continuous from off Chatham around the entire group of the Monomoy Shoals, the distance between the outside and inside 5-fathom curves being but 600 yards, with a depth of 4¾ fathoms between. The 1885 chart shows this distance to be about 800 yards, with 3¼ fathoms between and with several small shoals carrying less than 3 fathoms in the immediate vicinity. The 1888 chart shows this distance to be about 2,500 yards, with a minimum depth of 3¼ fathoms. The 1894 and 1900 charts give the distance as about 900 yards, with a minimum depth of 3¼ fathoms. The 1908 chart gives the extreme distance between the inside and outside 5-fathom contours as about 3,600 yards, with a minimum depth of 3½ fathoms, but with an intervening hole of 5 fathoms. The position of this easterly passage moved south from its 1860 position, the course from the Pollock Rip Light Vessel changing from due east to about southeast. (This passage is not the main or south passage by the Great Round Shoal Light Vessel.) The minimum depths all occur in the extreme easterly part and appear to be the southerly extension of broken part of Pollock Rip, the shoaling on the inside being much less in depth but extending over a wider area.

On the 1894 chart, along the north side of the deep water extending easterly from Butlers Hole, the 5-fathom curve extends noticeably into these shoals in three arms, which continue through the shoals with lesser depths, forming secondary channels; one close to the shore of Monomoy Island, one almost dividing Bearse Shoal from Pollock Rip Shoal, and one between Pollock Rip Shoal and the

Digitized by Google

broken part of Pollock Rip. The first of these was not shown the 1860 chart, and the other two were not very prominent; with the closing of the eastern 5-fathom passage they have increa until, on the chart of 1900, the passage between Bearse and Po Rip Shoals shows a minimum depth of 3¼ fathoms and that betw Pollock Rip Shoal and the broken part of Pollock Rip, known Pollock Rip Slue, carried 4 fathoms, with a distance of only yards between the outside and inside 5-fathom curves. On 1908 chart this latter passage has shoaled considerably, and sh but two isolated spots exceeding 5 fathoms in depth; it is the sage most used by vessels and is considered safe for 3½ fath As above stated, the Broken Part of Pollock Rip has rece made out about 1,200 feet to the westward, considerably narrow the northern entrance.

In 1860 the Shovelful Shoal and Bearse Shoal, as defined by 18-foot contour, were continuous and separated from Pollock Shoal. In 1874 the first two of these were separated and the two were joined together, with the southern part of Pollock Shoal broken into a number of smaller shoals, which condition continued up to the latest chart, but with varying outlines on successive charts. The Handkerchief Shoal, which is rather m protected from the heaviest waves than the outlying shoals and the fore more nearly continuous in form, had approximately the lowing areas inclosed within the 18-foot curve (the dates refer to dates of issue of charts).

	Ar
1860	1
1888	2
1894	2
1908	3

The above shows a continuous increase amounting to 70 per ce in 48 years.

The area of water exceeding 5 fathoms in depth in the east extension of Butlers Hole, within which area are stationed Shovelful Shoal and Pollock Rip Light Vessels, and limited on west by a line drawn from the northern limit of Stone Horse Sh to Monomoy Point, is as follows:

	Ar
1860	3
1888	3
1894	3
1900	3
1908	2

The measurement of any of the extreme outside shoals would very unsatisfactory, as these are very much broken up and oft indicated as a small circle around a single sounding.

The areas of shoals within the proposed channel on which th depth is less than that proposed, are approximately as follows, the various charts:

Digitized by Google

Date.	Stone Horse Shoal and lumps north of it.	Pollock Rip and Bearce Shoal.	Total.
	Acres.	*Acres.*	*Acres.*
860	192	1,020	1,212
874	100	840	940
885	180	840	1,020
888	210	910	1,120
894	260	960	1,220
900	250	940	1,190
908	280	1,000	1,280

The following is taken from Eldridge's Coast Pilot, 1890:

Pollock Rip.—During the last 40 years the water upon this dangerous shoal has been gradually increasing in depth. In 1832 some part of it was dry at low tide; in 1842, the least depth at low tide upon it was 3 feet; in 1852, 5 feet; in 1862, 6 feet; in 1872, 7 feet; and in August, 1887, 8 feet. From 1 to 1½ miles to the northward of the Pollock Rip, there are at this date (1890) many ridges of sand or broken rips, which are constantly changing in depth, and should be avoided by large or heavy draft vessels.

Broken part of Pollock Rip.—During the last 30 years this broken ground has extended seaward about four-tenths of a mile; the surveys that have been made across it from time to time, during that period, show changes in the depth of water in the ship channel.

Ship channel.—In 1852, on a direct course E. by S. ¼ S., from Pollock Rip Lightship, not less than 30 feet of water was found in this channel at low tide. In 1862, 24 feet; in 1872, 20 feet; and in August, 1887, 16 feet.

Northeast Channel (Pollock Rip Slue Channel).—The depth in this channel since 1851, has been constantly changing. A careful survey in August, 1887, shows not less than 17 feet, on a direct course N. E. ¼ N. from Pollock Rip Lightship.

Also the following:

The sand ridges on the northern part of Stone Horse Shoal near Shovelful lightship are constantly changing in depth.

From the above statements of changes in the shoals, together with the fact that on the edges of the proposed channel the depths would in many places be as small as 10 feet, and considering the great exposure of these shoals to violent storms, with consequent great movements of sand, it is apparent that the maintenance of this channel would almost certainly be very expensive.

BENEFITS TO BE DERIVED FROM PROPOSED IMPROVEMENT.

One of the benefits to be derived from the improvement is a probable reduction in the number of wrecks occurring annually on these shoals, with frequent loss of life. The annual cost to the Government of removing these wrecks has averaged about $3,269. No reliable information as to the diminution in the number of wrecks which would result from the improvement appears possible, though under present conditions there would undoubtedly be a considerable reduction.

The water distance from New York to Boston would be shortened by about 2 miles, this benefit being very slight as compared with the cost.

Considerable correspondence has been had with parties interested in the improvement and with others with a view to determining what reduction in freight and insurance rates could be expected if the improvement were made.

Digitized by Google

Regarding freight rates, Capt. R. M. Lavender, port warden, p of Boston, states:

It is my opinion it would not change the freight rates, as these are at present low as the common carriers can afford to carry coal.

Capt. John C. Silva, past president American Association Masters, Mates, and Pilots, of Staten Island, says:

If it is possible to reduce freight rates in any way on earth, it is by negotiating channel with but one turn in preference to making three turns over uncertain bo ground in the same short limit of space. I feel that by lessening the number of to make we would proportionately lessen the danger of running ashore or of coll on a thoroughfare so very important as this.

The American Association of Masters, Mates, and Pilots, Volun Harbor No. 4, states:

We do not expect any decrease of freight rates, but we are assured by the insura people that we can expect a decrease in the insurance rate, as this and Hell Gate considered the two most dangerous points on the coast for insurance.

The following statement as to freight rates and insurance on c between New York and Philadelphia as points of shipment a Boston as a point of delivery during the years 1906, 1907, and 1 has been kindly furnished me by Mr. J. S. W. Holton, preside Philadelphia Maritime Exchange:

Insurance on approved vessels.

[Rate per $100 of value of cargo and vessel.]

	New York terminals to Boston.			Philadelphia to Boston.		
	Under 10 years old.	Between 10 and 15 years old.	Over 15 years old.	Under 10 years old.	Between 10 and 15 years old.	Over 15 years old.
Apr. 1 to Oct. 31	$0.50	$0.60	$0.75	$0.55	$0.65	[illegible]
Nov. 1 to Mar. 31	.75	.75	1.25	.80	.80	

Vessel rates per ton alongside.

[Averages of the highest and lowest rates of the year.]

	New York terminals to Boston.	Philadelphia to Boston.
1906	$0.50 to $0.55	[illegible]
1907	[illegible]	[illegible]
1908	[illegible]	

[1] These rates are from what is known as lower ports. From upper ports they would be from 3 to 5 [illegible] less.

Regarding what reduction can be expected in insurance rates, t Boston Insurance Co. states as follows:

There are no fixed rates of insurance. We make our rates dependent entirely the different vessels, the time of year, etc., nor could we promise any reducti on account of the improvements, because the coal business has not been runni well, and the different underwriters interested in this class of business feel that rates are now too low. We would be very glad to have the improvements made a believe they would lessen the dangers; but the question of future rates would depe entirely on the experience of the business.

Digitized by Google

The Home Insurance Co., of New York, states:

I have noted with great interest your remarks and regret very much that it does not seem possible that any definite answer, such as you would wish to have, can be made to your inquiry. Our company is not engaged in the insurance of sail vessels or their cargoes, but we are interested in other kinds of coastwise shipping. We, with all other underwriters, recognize the dangers of Pollock Rip Shoal and Stone Horse Shoal, and in 20 years' experience I can recall losses owing to these perils aggregating without doubt, I should judge, several hundreds of thousands of dollars, in many of which this company has suffered; but I do not see how it is possible to calculate what percentage of the rate paid for the insurance of a coastwise vessel or her cargo can be directly chargeable to these particularly hazardous locations.

You will understand that the rates on the various classes of coastwise vessels vary very materially in accordance with the class of vessel, her age, trade, etc. For instance, on an iron or steel tug, with privilege of the north Atlantic coast, the rates would vary from 4 to 7 per cent per annum, based on the age and condition of the vessel. In the case of an ocean barge the rates vary from 5 to 12 per cent, according to age, construction, and route. The rates on coastwise steamships vary from 3 to 8 per cent. All these classes of vessels are customarily insured under an annual policy, the rate paid being for the average for an entire year, and the rates are theoretically based on the outcome of the business for a series of years, modified by competitive conditions, so that it does not seem at all possible to say how much of the rate is chargeable to a specific location or hazard.

The proposed work in the locality referred to would undoubtedly be of immense value to coastwise shipping; and as every improvement in the conditions of navigation on our coast has been sooner or later followed by a reduction of the insurance premiums on vessels exposed to the hazard in question, it it reasonable to suppose that the improvement of the location would lead very quickly to a reduction of insurance premiums on vessels trading in the waters affected.

I regret that I can not give you a more specific answer to your requirement; but, in my opinion, to attempt to estimate in advance a reduction, based on the improvement in question, would be at best a vague conjecture.

The Providence-Washington Insurance Co., of Providence, R. I., states:

Any improvements in navigable waters which tend to reduce losses necessarily reduce marine-insurance rates. The competition is intense, and the business is done very close to cost; sometimes below.

In this case the rates might possibly be reduced slightly as soon as the improvements were made; but when the companies found that their losses were materially reduced in consequence of the change, heavier reductions in rates would necessarily follow.

Messrs. Johnson & Higgins, of New York, make the following statement:

We are unable to answer your question as to what effect this will have on marine insurance, as we do not make the rates, being only brokers. It seems to us that your inquiry should be addressed to underwriters, who alone would be capable of making a definite reply. Incidentally, we might say that we do not believe the removal of this shoal will affect the rates of insurance. These rates are based upon the character of vessels employed and the results shown over several years of experience. We do not know what proportion of wrecks has occurred on Stone Horse Shoal; but we are certain that there are many other dangerous points on the route between New York and Boston and Chesapeake Bay points and Boston which will continue a menace to navigation and will necessitate the gauging of insurance rates accordingly.

CONCLUSIONS.

The great importance of the coastwise trade between New England and the Middle and Southern States around Cape Cod, were the commerce to remain as it now stands or to increase, would seem to justify a considerable expenditure by the Government on any feasible plan toward reducing the great annual loss of property and life due to the dangers of Monomoy Shoals. As stated above, however, it is believed

Digitized by Google

that the dangers due to the present large commerce, and particula the danger of collision with steamers and long tows, will be v greatly reduced upon the completion of the Cape Cod Canal, th the exact effect of the construction of this canal is not yet kn Further change in the present conditions of water commerce ma expected if an inland water route between Boston and Beaufort, N is later provided. The proposed channel would be costly of const tion. The cost of maintaining it would be undoubtedly large might be so great as to be impracticable. The question as to whe or not the Government should attempt by dredging to improve passage through these shoals, either by the proposed channel or in a other way, ought, in my opinion, to await the developments due t completion of the Cape Cod Canal at least.

It is my opinion, therefore, that this locality, as described in river and harbor act of March 3, 1909, is not worthy of improvem by the General Government at the present time.

None of the special subjects of inquiry mentioned in the river harbor act of March 3, 1909, in connection with the matter of prel nary examinations appear to apply to this case.

Very respectfully,

J. C. SANFORD,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
Washington, D. C., November 19, 1909.

Respectfully forwarded to the Chief of Engineers, United Sta Army.

The locality in question is not worthy of improvement by General Government. It is characterized by shifting shoals, a any artificial channel dredged through these would be unstable, a hence misleading.

While the record of marine disasters on the Monomoy Sho (north passage) is large, like disasters in the south passage se decidedly infrequent.

It is thought relief from the danger of rounding Cape Cod w more certainly follow using the somewhat longer course around a outside of Great Round Shoal than attempting to maintain a p carious artificial channel through the Monomoy Shoals.

JOHN G. D. KNIGHT,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., January 3, 1910.

Respectfully returned to the Chief of Engineers, United Sta Army.

The preliminary examination of Nantucket Sound reported up within was ordered with a view to the removal of the northerly e of Stone Horse Shoal and of such portions of Bearse Shoal and Pollock Rip Shoal as may be necessary. After a description of th

Digitized by Google

Digitized by Google

[Fifth indorsement.]

WAR DEPARTMENT,
January 13, 191

Approved.

ROBERT SHAW OLIVER,
Acting Secretary of War

SURVEY OF NANTUCKET SOUND, MASS.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 21, 1911

SIR: The board of officers constituted by Special Orders, No. 2 office of the Chief of Engineers, August 28, 1911, to consider a report on survey of Nantucket Sound, has the honor to submit following report:

Upon call of the senior member the board met at the United Sta engineer office, Newport, R. I., on Tuesday, October 17, 1911, at o'clock a. m. The reports, maps, and other data pertaining to t subject were examined, and on the 18th a duly advertised pu hearing was held at the same place. A stenographic report of t hearing is appended. After discussion the board adjourned pend the preparation of a draft of its report. It met again on Novem 21, when the draft was considered, and with some modifications w adopted. The full board was present at all meetings and at t hearing.

The provision for examination and survey of the locality as co tained in the river and harbor act of March 3, 1909, is as follows:

Nantucket Sound [Mass.], with a view to the removal of the northerly end of Sa Horse Shoal, and of such portions of Bearse Shoal and Pollock Rip Shoal as may necessary.

The duty of making the preliminary examination under this prov sion was assigned to Lieut. Col. J. C. Sanford, Corps of Engineers, th in charge of the Newport, R. I., engineer district. His report November 16, 1909, gives a detailed description of the locality and the difficulties and dangers of navigation in the general vicinity with general data relative to winds, seas and currents, and statist of commerce. Lieut. Col. Sanford describes the nature of the improvement desired, considers in a general way the cost of making a maintaining the proposed improved channel, and concludes that th locality is not worthy of improvement by the General Government a the present time, on account of the cost of the work, uncertainties the results, and probability that the difficulties it is sought to reme will be ameliorated by the completion of the Cape Cod Canal, as w as on account of changes in the conditions of water commerce th may result if the proposed inland water route between Boston an Beaufort, N. C., is later provided. The division engineer, Col. J. G. D Knight, Corps of Engineers, in indorsement of November 19, 190 concurred in the view that the proposed improvement was no advisable.

The above report was reviewed by the Board of Engineers fo Rivers and Harbors in connection with subsequent representations b persons in favor of the improvement. In an indorsement of January

Digitized by Google

Digitized by Google

A]

Sn
office
re
fo
Up
en
o'c
su
hea
hea
the
21,
ado
hea
The
tain

Nan
Hors
nece

The
sion w
in ch
Nove
the di
with g
of con
prove
mainta
localit
the pre
the res
will be
as on
may re
Beaufo
Knight
concur
advisab
The
Rivers
persons

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

1910, that board expressed the view that the interests concerned ere sufficient to warrant obtaining more detailed and definite information regarding the local conditions and probable cost of the improvement. Additional surveys, observations, and estimates were made under instructions from the Chief of Engineers, and the results have been carefully studied by the board. Tables and maps[1] showing the above data are appended to this report.

The improvement desired by the navigation interests is the creation by dredging of a straight channel not less than seven-eighths nautical mile (1 statute mile) wide and 30 feet deep at low water, from the Handkerchief Light Vessel, about 5½ miles southwest of Monomoy lighthouse, extending northeastward to the whistling buoy near the present northern entrance to the Pollock Rip Slue. A very large commerce of over 20,000,000 tons annually will be benefited greatly if it be practicable to construct and maintain such a channel. The dangers and difficulties encountered in navigating the present crooked and in places narrow channel through the shoals, and the benefits to be anticipated from the creation of a broad and straight 30-foot channel in place thereof are well stated in the appended report of the hearing of October 18, 1911, Appendix I. The only opposition to the creation of the proposed channel, so far as the board has learned, has come from persons interested in the success of the Cape Cod Canal, now under construction. They assert that the proposed straight channel through the shoals will be unnecessary after that canal is opened, and that the Government would do better to appropriate money for breakwaters to protect the northern entrance to the Cape Cod Canal than to expend funds for dredging the proposed straight channel. The question of such a breakwater is not before the board. The statement that even after the Cape Cod Canal is opened a large commerce would continue to use the outside route through the Pollock Rip Slue was repeatedly made at the hearing.

The appended estimates of quantities to be dredged and other data have been compiled in compliance with the request of the Board of Engineers for Rivers and Harbors. In a general way they indicate that dredging and maintenance of the proposed channel may be practicable, but the successive surveys available for comparison were made at too long intervals to afford data on which to base reliable conclusions and estimates of cost.

The appended chart, plate 2, showing the position of the 5-fathom curves, the sailing courses and the position of the light vessels marking same, for the years 1860, 1874, 1885, 1895, and 1908, all derived from the charts of the United States Coast Survey for those years, respectively, shows that great changes have taken place in the channel through the shoals marked generally as broken part of Pollock Rip. In 1860, 1874, and 1885 the channel is shown extending in an easterly direction from the Pollock Rip Light Vessel, though there was also a northerly channel from this light vessel in 1874 and in 1885. In 1895 and 1908 a northerly channel is the only one shown. There were also various changes between the Pollock Rip Light Vessel and the one near the southern portion of the Handkerchief Shoal during the period covered by the charts, and corresponding changes in the sailing courses and the light vessels marking them. It will be

[1] Plates 1 and 3 only printed.

Digitized by Google

noted, however, that during the period covered by the several published charts referred to a clear channel or passage with over 30 feet depth at low water has existed in a fairly permanent position, extending westward and southwestward from the mean position of the Pollock Rip Light Vessel to that of the Handkerchief Light Vessel, and the general total width of the passage has remained a mile or more, except at the turn in the vicinity of the Shovelful Light Vessel, where the width of channel 30 feet deep and over at mean low tide has been about one-third of a mile. The distance in a northeast direction from deep water south of Bearse Shoal to deep water beyond Pollock Rip has not been more than about 2 miles at any one time, and the line of the shortest course across this shoal portion of the proposed channel has not undergone very radical changes in direction or position, although it has been far from constant in these respects. Especial attention is invited to the comparative chart on which is shown the number of cubic yards of cut and fill in the area covered by the proposed channel found by dividing that area into squares one-third of a mile on a side, and computing the mean depth in each square at the time of each survey.

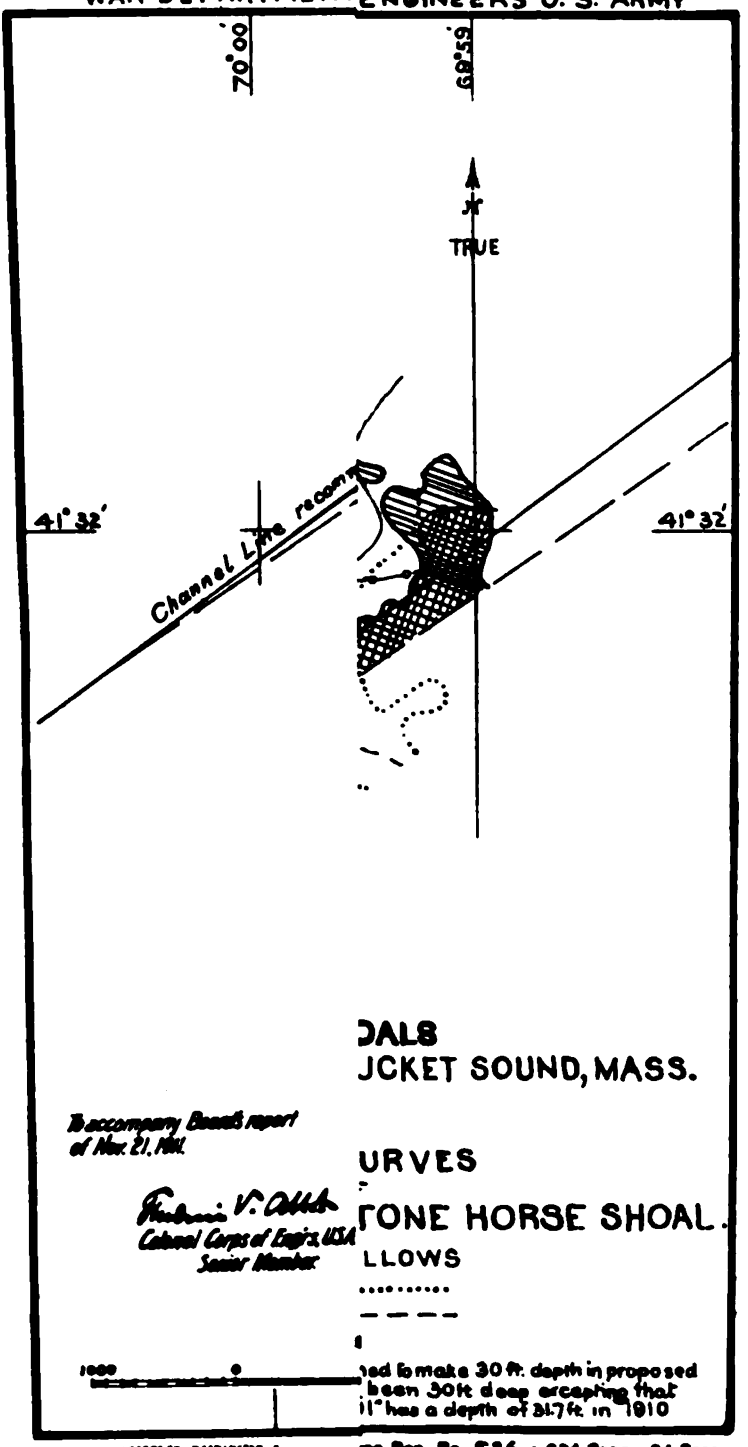
The available information regarding the material of which the shoals are formed is to the effect that they are largely composed of sand of a character to be easily handled by a suction dredge, but at the hearing on October 18 the view was expressed by one of the speakers that in places below the depth of 6 or 7 fathoms there is hard mud or clay under the sand. It was also stated that rock or bowlders were to be found on Stone Horse Shoal. The narrow and deep channel that has been maintained in the vicinity of the Shovelful Lightship indicates that possibly in that locality the shoals contain harder material than sand. The possibility of clay and bowlders forming part of some of the shoals is indicated by the general characteristics of some of the islands and portions of the mainland of southeastern New England. The exposed location has so far prevented a definite determination of the nature of the material that will have to be dredged to form the proposed channel by borings or otherwise, but the fact that at times the surveys have shown 30 feet or more of water where the depths are now much less indicates that a large part of the yardage to be removed is mobile in character, and hence is probably sand. (See pl. 3.)

Consideration of the above conditions in connection with the other data available leads to the conclusion that the practicability of dredging and maintaining the proposed channel can be determined only by trial on a large scale. The great volume of commerce concerned, certainly over 20,000,000 tons per annum, and the prospects for at least partial success are such as to warrant an expenditure by the General Government for such an attempt. Any widening of the available channel in the vicinity of Shovelful Shoal Lightship by dredging the northern portions of Stone Horse Shoal would be immediately beneficial to commerce, as it would give more sea room at this dangerous turn and would greatly reduce the dangers of collision; this could undoubtedly be secured while the dredging of the complete straight channel was in progress, even if the entire straight channel could not be completed. A much narrower channel through the Pollock Rip near Bearse Shoal than the one proposed could be utilized to advantage by steam vessels under favorable con-

Digitized by Google

PLATE 3

WAR DEPARTMENT ENGINEERS U. S. ARMY



Digitized by Google

Digitized by Google

ditions, and the successful creation of such a narrow channel would afford a practical test of the question whether the wider channel could be maintained at reasonable cost by dredging, assisted by the scouring action of the currents.

The United States owns a number of seagoing dredges adapted to this general class of work, and the board has been informed that other works on which they are engaged are now in such shape that one or more of these dredges may be available within the year for practical tests on the Pollock Rip Shoals and vicinity. Such tests, besides producing results immediately beneficial to navigation, would develop beyond conjecture the nature of the material to be handled, the cost of its removal, and whether any changes in the existing types of seagoing dredges are needed for economical and effective work at this locality. If the results so attained should warrant undertaking the dredging of a complete channel, as suggested by those interested in the improvement, the most advantageous and economical methods of carrying out the work, and its cost, would be more definitely known than at present.

We therefore recommend that an appropriation of $250,000 be made for improving the channel through the shoals at the eastern approach to Nantucket Sound in general accordance with this report, the wording of the act to be such as to make it plain that the United States is not committed to the continuance of the improvement beyond the $250,000. After the work has been carried forward to that extent, the advisability of further work should receive consideration.

Respectfully submitted.

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.
JOHN MILLIS,
Colonel, Corps of Engineers.
EDW. BURR,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 19, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This is a report upon survey of Nantucket Sound with a view to improvement in the vicinity of Pollock Rip Shoals, submitted by a special board to whom was assigned the duty of making this investigation. It appears that much interest has been manifested in this improvement, which indicates its importance and its bearing upon general commerce and navigation. The special board states that the improvement desired by navigation interests is a channel not less than 1 mile in width and 30 feet in depth at low water from the Handkerchief Light Vessel about 5½ miles southwest of Monomoy Lighthouse, extending northeastward to the whistling buoy near the present northern entrance to the Pollock Rip Slue, to replace the present crooked and in places narrow channel.

Digitized by Google

A study of the charts of this locality indicates that the present channel of about 30 feet minimum depth through these shoals has existed for a number of years, but has undergone decided changes in its location, indicating the mobile character of the material on the bottom. The special board finds it impossible to make a reliable estimate of the cost of dredging and maintaining a channel of the dimensions desired by the navigation interests, and concludes that the practicability of the work can be determined only by trial on a large scale. It calls attention to the fact that the United States owns a number of seagoing dredges adapted to this class of work, and that one or more dredges of this type will probably be available within a year for such a test. The prosecution of the work along these lines would produce immediate benefits to navigation, and would definitely determine the nature of the material to be handled, the cost of its removal, and the suitability of these dredges for work of this character. Believing the locality worthy of such a test, the special board recommends an appropriation of $250,000 for this purpose, and stated that the authorization of this trial should not bind the United States to continue the improvement beyond the appropriation recommended at the present time, the advisability of further work to be determined after the results of the test now proposed are made known.

The question of a safe and adequate channel in this vicinity is a very important one to navigation interests. The course suggested by the special board is conservative, comparatively inexpensive, and should determine much more definitely than is now possible the feasibility and desirability of attempting the full improvement desired. The board therefore concurs in the general findings of the special board and recommends an appropriation of $250,000 for the work proposed. The total amount should be made available in one appropriation. In this case there are no questions of terminal facilities, water power, or other related subjects that have any bearing upon the improvement proposed.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

APPENDIXES.

I. Record of public hearing at Newport, October 18, 1911.
II. Facts regarding winds derived from United States Weather Bureau records taken at Nantucket.
III. Effects of the directions of tidal currents in vicinity of Pollock Rip.
IV. Analysis of surveys, showing cut and fill in different parts of the area of the proposed channel at various periods since 1853.
V. Yardage of material within the limits of the channel as shown by survey of 1910, of which the removal is probably necessary to give a clear channel of 25 feet and of 30 feet depth, respectively, at mean low water.

PLATES.

1. Survey of Pollock Rip Shoals vicinity made in 1910.
[1] 2. Comparison of positions of channels and aids to navigation shown on Coast Survey charts of 1860, 1874, 1885, 1895, and 1908.
3. Comparison of 5-fathom curves of Stone Horse Shoal from detailed surveys in 1856, 1872, 1883, 1891, and 1910.

---

[1] Not printed.

Digitized by Google

[1] 4. Index chart showing locations of comparative cross sections and profiles, from surveys of 1853, 1872, 1883, 1891, 1909, and 1910, as shown on plates 5 to 12.
[1] 5. Profiles of line IX.
[1] 6. Profiles of lines AB and CD.
[1] 7. Cross section I.
[1] 8. Cross sections II and III.
[1] 9. Cross sections IV, V, and VI.
[1] 10. Oblique cross sections VI to VII, VI to VIII, VI to IX, and VI to XI.
[1] 11. Oblique cross sections XII to XIV and XIII to XV.
[1] 12. Oblique cross sections XVI to XVII.
[1] 13. Cut and fill on individual areas one-third of a mile on a side occuring between surveys of 1853, 1872, 1883, 1891, 1899, 1902, 1909, and 1910, and mean depths at each date in each square.
[1] 14. Index map showing letters and figures designating each square one-third of a mile on a side.

APPENDIX I.

[Record of public hearing.]

TRANSCRIPT OF NOTES TAKEN AT A PUBLIC HEARING HELD AT THE UNITED STATES ENGINEER OFFICE, NEWPORT, R. I., OCTOBER 18, 1911, BEFORE THE BOARD OF OFFICERS OF THE CORPS OF ENGINEERS CONSTITUTED BY SPECIAL ORDERS, NO. 21, OFFICE OF CHIEF OF ENGINEERS, CURRENT SERIES, CONSISTING OF COL. FREDERIC V. ABBOT, COL. JOHN MILLIS, AND LIEUT. COL. EDWARD BURR, CORPS OF ENGINEERS, ON THE MATTER OF THE NECESSITY AND ADVISABILITY OF CONSTRUCTING A CHANNEL ACROSS NANTUCKET SOUND.

INDEX.

By names.

	Page.
Board:	
Abbot, Col. Frederic V	26-31, 33, 35, 38, 39, 40
Burr, Lieut. Col. Edward	28, 29, 36, 39
Millis, Col. John	35-37
Abbot, Capt. Alfred	31
Blankenship, John M	29, 30
Brewer, William C	26, 27
Chase, Capt. D. R	32, 36
Cherry, J. M	32, 35
Crowley, Capt. John G	27
Cullin, Capt. N. L	30, 35
Eldridge, George W	34, 36, 38, 39
Gibbs, Capt. Charles I	36, 38, 40
Greene, Hon. William S., M. C	33, 35
Hammond, Capt. J. W	32
Hawes, Capt. T. E	31
Hillary, Capt. Miles	30, 36, 37, 39
Hopkins, Capt. H. L	32
Lavender, Capt. R. M	27, 28, 33, 36, 39
Metzler, Christian E	33
Spinney, L. A	28, 29, 35, 36, 37, 39
Thompson, Charles M	38
Woolley, George H	31

By subjects.

	Page.
History of movement to secure channel	28, 34
Dangerous nature of passage	26, 27, 28-32
Width of channel desired	36-39
Depth of channel needed	27
Depth of present channel has increased, and maintains itself	32, 36, 37
Direction of current	35, 40
Direction of run of the sea	36
Difficulty of hearing fog signals	36, 40
Ice	36, 40
Fogs	39, 40

[1] Not printed.

Digitized by Google

Page

Delays due to weather..... [illegible]
Cost of delays per day..... [illegible]
Length of hawsers and conditions of towing..... [illegible]
Channel compared with a canal..... 28, 29, 36, [illegible]
Cape Cod Canal.....
Probable time a seagoing dredge could work.....
Rock and gravel at Stone Horse Shoal..... [illegible]
Clay.....
Freight rates..... [illegible]
Parties interested..... 27, [illegible]
Railroad representation at hearing.....
Tonnage or number of vessels represented at hearing..... [illegible]
Instances of loss of vessels..... 27, [illegible]
Need of improvement..... [illegible]

OCTOBER 18, 1911—*11.10 a. m.*

Col. ABBOT. The meeting will please come to order. By Special Orders [illegible] War Department, Office of the Chief of Engineers, Washington, August 28, [illegible] board consisting of Col. Frederic V. Abbot, Col. John Millis, and Lieut. Col. [illegible] Burr, Corps of Engineers, was appointed to consider and report on the survey of Nantucket Sound, with a view to the removal of the northerly end of Stone Horse [illegible] and of such portions of Bearse Shoal and Pollock Rip Shoal as may be necessary, [illegible] vided for in the river and harbor act of March 3, 1909. The board was authorized [illegible] hold a public hearing, which has just been called to order. The board has [illegible] the technical data necessary to answer the questions of how and where and as to [illegible] We have asked you gentlemen to come here so that we can learn from you the [illegible] for such a channel, the best figures we can obtain as to how much commerce will [illegible] it, how much is passing through there now, and as to the dangers of the present [illegible] tions, and any other facts bearing upon the economical side of this question. There is a technical side and an economical side. We have the data for the technical [illegible]

I shall ask Mr. William C. Brewer, of the Boston Chamber of Commerce, to present his matter first, as I know he desires to go to New London by one of the early trains.

STATEMENT OF MR. WILLIAM C. BREWER, OF THE BOSTON CHAMBER OF COMMERCE.

Mr. BREWER. I thank you, Mr. Chairman. First I will say that about the 4th of October the committee on maritime affairs of the Boston Chamber of Commerce received a communication from you to the effect that this matter was under consideration. As soon as was possible the committee sent out notifications to the various maritime interests of Boston, including the ship-owning and the shipbuilding interests, the navigation interests, and the marine underwriters. The earliest possible date at which it was convenient to have a general meeting was yesterday morning. The committee met and before them appeared an unusually large representation of the marine interests. It was the largest representation, I think, in the history of the Boston Chamber of Commerce in such a matter. I merely mention this as showing the interest taken in the project. There was submitted a plan showing the general direction of the channel. In a brief way it was stated about what the cost would be. The testimony then given by shipowners and by masters generally showed the great need for this improvement, great emphasis being laid on the tortuous and dangerous nature of the passage at the present time and the very great need of straightening. Details were entered into at considerable length showing the use such a channel would be to navigation, how it would facilitate the passage of shipping over the shoals which is now held up by inclement weather at both ends. Everybody there had a chance to speak. Capt. Crowley will speak later as to these details, he being my assistant here from the Boston Chamber of Commerce, and will go more into the details. Coastwise shipping companies were represented, most of the marine underwriters, some of the steamship owners, and some of the sailing-vessel owners. There were also presented a number of letters from masters of coastwise steamers, and all testimony given was entirely in favor of this project. There was no dissenting note from anybody. The committee was most anxious to have it go through, and endeavored to find out more definitely what would be the cost of the project, but no figures were submitted by anybody. After the meeting—and this in particular is my duty here—the committee passed a vote unanimously favoring the project, and then to have it authenticated it was submitted to the directors of the chamber of commerce in session in the afternoon, and they passed this resolution, which I will read:

(Reads resolution, marked "Exhibit No. 1," copy appended.)

Digitized by Google

In order to present this matter to you as effectively as possible and to show the interest taken in the matter by the chamber of commerce, they then passed a vote that the president be asked to appoint a committee to be present at this hearing, and the president appointed myself and Capt. John G. Crowley for that purpose. I thank you.

(Submitted certificate of appointment, marked "Exhibit No. 2," copy appended.)

STATEMENT OF CAPT. JOHN G. CROWLEY.

Capt. CROWLEY. Mr. Chairman, I was appointed one of the committee to come here and present the resolutions which have been read. I represent the Boston Chamber of Commerce and also the Coastwise Transportation Co., which has 21,000 tonnage of steamers and 32,000 tonnage of sailing vessels.

(Submitted letterhead of the Coastwise Transportation Co. giving list of vessels and tonnage, marked "Exhibit No. 3," copy appended.)

Being a master mariner myself and having traveled over Nantucket Shoals as long as any man here, from boyhood, and coming here to speak of this channel, I wish to say that I think this is one of the greatest schemes ever put before the public, as it makes a straight course from the Handkerchief Lightship out to the open sea, and vice versa. We have to make this angle here [indicating on chart], go out to Great Round Shoal and make another turn, encountering the cross currents both ways. If this channel were provided, we would have a straight course through there. Sailing vessels coming down from Boston have to anchor in the channel, it being impossible to come up here [indicating]. We do not have proper anchorage. The *Calvin Olcott* came down here and could not make the angle and had to anchor off there [indicating]. She parted her chains in the storm and was driven ashore, the crew being lost, the life-savers being unable to reach them. Coming from the westward, it is almost impossible in a northwest gale to come down here with a sailing vessel. We have to stop at the Handkerchief; therefore the vessels are late in returning to Boston. With this channel, as proposed, a vessel could come right down on a straight course. This channel through there, with a very small expenditure of money, will give a straight channel—something that is needed more than anything else that I know of at the present time by coastwise and foreign vessels.

Col. ABBOT. What depth is needed, in your opinion as an expert navigator, for this proposed channel to accommodate the deepest draft traffic likely to use it?

Capt. CROWLEY. At the present time, 30 feet. Our largest steamer draws, loaded, about 26 feet.

Col. ABBOT. Is there any place along the route from Long Island Sound to Boston where there is a less depth than 30 feet of practicable navigable width?

Capt. CROWLEY. No, sir.

Col. ABBOT. Any in Nantucket Sound?

Capt. CROWLEY. No, sir.

Col. ABBOT. And by the Cross Rip Lightship you can use 30 feet?

Capt. CROWLEY. Yes; we have to make a sharp turn there. There are one or two points almost east of the lightship also.

Col. ABBOT. That is also a dangerous location?

Capt. CROWLEY. Yes, sir.

Col. ABBOT. How is the exposure there? Is it as dangerous as at Monomoy?

Capt. CROWLEY. No, sir; it is less dangerous.

Col. ABBOT. Why?

Capt. CROWLEY. Because if a vessel starts to go across there she can be held off.

Col. ABBOT. And is that a good reason why you do not need more than 30 feet, as it is narrow at Cross Rip?

Capt. CROWLEY. Yes, sir.

Col. ABBOT. We want to know what you need in depth in order to develop all the benefit we can with this one improvement.

Capt. CROWLEY. Thirty feet is all that is required.

(Deposited list marine interests attending chamber of commerce committee meeting, marked "Exhibit No. 4," copy appended.)

Col. ABBOT. Now, I would be glad to hear anybody else on this same side.

STATEMENT OF CAPT. R. M. LAVENDER, PRESIDENT PILOTS' ASSOCIATION OF BOSTON.

Capt. LAVENDER. Having from my boyhood days navigated Nantucket Shoals, and knowing the conditions that existed there in those days with lighter draft vessels, and also knowing that in later years the channel has grown deeper, and taking into consideration the conditions now, it has been demonstrated, I think, that this chan-

Digitized by Google

nel can easily be kept clear by a little dredging work. It has deepened from 12 to 20 feet now by the constant use of it by steamers. I can vouch for all that Capt. Crowley has said. We know the conditions as they existed and as they exist to-day, and we believe in the project.

STATEMENT OF MR. L. A. SPINNEY.

Mr. SPINNEY. Mr. Chairman, I was sent here as a member of the Pilots' Association and I also appear as a delegate from the Boston Marine Society. I believe that the first record of any active interest in this project was made by the Boston Marine Society; and I have deposited on the stenographer's desk a record of the action taken by that society.

(Submits paper, marked "Exhibit No. 5," copy appended.)

The society is composed of the marine men, including nearly all the men engaged in Boston and Massachusetts in maritime work, going back to the old ships and coming up to the present large steamers. In the year 1908 this project was brought up in the society during the middle of the year. At the November meeting a petition was circulated and by vote of the society the petition was sent to Congressman Greene, with a request asking him to take the matter in hand. That year, through Congressman Greene's advice, the matter was taken up in Washington and in 1909 an appropriation was secured for this survey. The matter was returned through the department to Col. Sanford. Going by the old surveys, from which the present charts were made, the colonel found several reasons why he did not think the matter was properly to be carried on at this time, due to the expense and other things. The department at Washington gave us a hearing on December 7. At that time the representatives presented their ideas and the matter was returned to the department with orders to prosecute the survey, which was made in August and December of last year. I wish we could have the technical information you have to use, because I believe it would be to our interests. You hear things about there being some opposition to this channel; but you can not quote anyone. I believe the information you have would be to our interest. The water must have been deeper up there than the charts show or else you would have broken water there; there would be a ripple instead of being smooth. I understand a man walked across there in the year 1850. With the tide running three hours out of every six in this channel it has removed a great deal of the sand. It must be much deeper there than the charts show or we would have broken water there. Your survey gives you the exact information.

Col. ABBOT. There is a copy there on the table.

Col. BURR. Which shoal are you speaking of now?

Mr. SPINNEY. Of Bearse Shoal and Pollock Rip Shoal. There was 12 feet of water there; now there are 25 feet. The volume of sand to be removed was estimated at 15,000,000 cubic yards. I understand from the survey that there is not much more than half of that there now. It seems that time has removed in 20 years a large body of sand. That body of sand has been over one-third removed. The tide in that time would remove a sufficient amount of sand to entirely close up the channel if there was any disposition to close it. The tide which cuts this channel may be depended upon to keep it clear to a width of seven-eighths of a mile. The present channel is three-eighths of a mile wide. The strength of the tide runs three hours east-northeast and the other three hours in the alternate direction. When the tide changes it commences to slow up. This great body of sand would close up the channel if it had not tended to make deeper water by some force. They are using the same old channel as formerly, only it is carrying 25 feet of water instead of 12 feet. The increased draft of vessels has brought about a change in the bottom. Your chart shows a change of 4 fathoms, necessitating the moving of the buoy last year. Vessels of 22 or 23 feet draft struck on this slue. The vessels using the channel to-day go in the old channel, disregarding the way in which the buoy has been removed by the *Azalea*, I believe. What information was obtained was obtained in one period of slack water, and the information so gained in that 20 or 30 minutes led to the change of the buoy.

The old channel southwest of the Pollock Rip Lightship is still used. The sand has not moved out from the broken part to where the buoy is now; it is the old 4-fathom lump. The department has never removed a single wreck from this locality. There are hundreds of them there. They have been blown up by dynamite and sand collects around the wreckage. If you will build a jetty by dumping a shipload of stone, it is reasonable to suppose that if you blow up a wreck with dynamite, when the wreckage rests you will collect some sand. The only lumps you will find there are formed by wreckage. The shoals are not changing except so far as this tide has forced its way through the shoals. There are 6 fathoms of water there now

Digitized by Google

where there was but 3. The tide is bound to cut it out. In 20 years it would make its own channel. There is more traffic through that channel, so far as we can estimate, than almost any other. We have arrived at the conclusion, which I believe will be backed up by the figures, that there is more traffic through there than in any other place, except the port of New York, and even that exceeds only in tonnage; I question if it does in the number of vessels. The channel should extend west-southwest; now we have to go west-northwest, which is very difficult for sailing vessels. We should also look at this question from the humanitarian side. No matter what other relief you may provide, if you provide a canal it must be provided for by tolls. Only a certain class of traffic can use it anyway.

There always has been and there always will be a large class of vessels, sailing vessels, which will use the Pollock Rip Shoals Channel, whether you improve it or not; and you will continue to have loss of life and of property if you do not improve it. I think it would cost less to do this work than it costs the underwriters to pay the expenses of losses. I remember the day when the *Dimmock* and the *Hall* collided. The *Hall* was a total loss. The *Biscayan* collided with the *Goodenow*, and two other vessels were sunk, on March 12, 1908. The underwriters paid for that day more money than it would cost to construct this channel. This channel when dredged will be largely maintained by nature; otherwise the present channel would have been filled up and closed. I do not think there is any question of maintenance. The law which creates the present channel will maintain it. Sailing vessels will use that channel, particularly in the winter time, when any other relief would be closed by the location and geograpby of the place. Every winter vessels must round the Cape to Provincetown, or go to destruction. That being the condition, aside from any other question at all, the channel should be provided for their protection from any gale that may come. If that was the only consideration, the argument would be well made for this improvement. The dangers are not so much from the stranding of a vessel as from collision. A tug with barges meets a tow coming down from the Shovelful. It has to make a sharp turn in there and you have collisions there. With this channel once straightened, the tide will keep it straight, and, I believe, will keep it deep. We could then keep one side of the lightship, and the great danger will have been removed in the minds of those using the channel. The eastern approach is what gives us the trouble.

Col. ABBOT. That is Bearse Shoal?

Mr. SPINNEY. Yes; Bearse Shoal.

The natural action of the tide has removed from one-half to two-thirds of the sand since the former survey. If we are saving every year the lives and property of the men who use the channel, that alone would be worth the constructing of the channel. One of the reasons formerly advanced against this channel was that there was no depot available for supplies. Now Nantucket Harbor is being improved and supplies can be obtained there. The only other relief is the relief suggested by going through the canal, the Cape Cod Canal, and that involves extra expense because it is a commercial proposition and must earn money to make it pay. The present rates of freight are so low that they do not allow vessels to pay tolls. This channel will always be used. On the petition for this improvement you will find every underwriter of importance, every insurance company of importance, every steamship company in New England of any importance—in fact, everyone who is called upon to use the channel. The Boston Marine Society, whose record I have handed in, has in its membership the chief interests involved. From all that class of people this improvement has their earnest support. If anyone would like to ask any questions, I will try to answer them.

Col. BURR. What are the freight rates at present?

Mr. SPINNEY. On coal, 60 to 75 cents a ton.

Col. BURR. From where?

Mr. SPINNEY. From Newport News and Chesapeake Bay points to Boston. I have been told by a representative of one of the steamship companies that the minimum rate of tolls through the Cape Cod Canal would be 10 cents a ton. They could not pay that. They are running so close now to the margin of profit and loss that they could not pay 10 cents a ton in tolls for going through the canal.

STATEMENT OF MR. JOHN M. BLANKENSHIP.

Mr. BLANKENSHIP. I represent the Merchants & Miners Transportation Co., which operates a line of steamships from Jacksonville, Fla., into Boston. We have 936 sailings every year over the shoals—over two and one-half times a day. I do not hesitate to say that there is no improvement which could possibly be made on any ground we cover as important as this one. Any delay we have can always be counted

Digitized by Google

as being on the shoals. You know what delays mean to the shipping interests and what they mean to us. I think that channel is what is needed. From what I have read of the subject, it seems that all that is needed is simply to start it. Get an appropriation for a dredge, such as are used on the Savannah River, and start this channel. Nature will keep it going. Our company wishes to go on record as strongly favoring this channel. We have here to-day Capt. Miles Hillary, who will go into this matter more in detail as to the navigating part of it.

Col. ABBOT. Will you file the names and drafts of all your steamships using this route?

Mr. BLANKENSHIP. Yes, sir. We handle 1,000,000 tons of freight a year. I hope it will be twice as big in two or three years.

(Letter filed, marked "Exhibit No. 13," copy appended, inclosing data, marked "Exhibit No. 14," copy appended.)

STATEMENT OF CAPT. MILES HILLARY.

Capt. HILLARY. I will try to give the practical experience of those who use the channel. For instance, leaving Boston in a fog, we can come down here to Chatham without difficulty. The tide is fair. The wind is blowing. We are a little anxious now regarding going across the shoals for fear of collisions. Here the vessels anchor in the course of vessels, at such places as the Slue, or around on the other side of Pollock Rip Shoal. We may meet one, two, or three tows, coming or going, with hawsers from one-half to three-fourths of a mile long. One time I had a cargo worth $600,000. The ship was worth $300,000, and I had on board 100 passengers. I laid there waiting for daylight, as I did not care to take a chance of going through for fear of meeting tows in the channel. I had to wait there 12 hours. My passengers were urging me to go on. They were saying: "I am losing my train." "This is the last time I will come on this line." "Do not wait till daylight." Finally, I said, "Well, I will start." I heard the bell and looked and saw I had just missed the bow of a tug. I must go full speed through there because of the cross currents of the tide. Perhaps the sound of the bells may be in a zone where I do not hear. I go on and make my turn on the clock. I have been in the towboat business myself. They usually have very skillful men on the towboats. I cleared the turn and then heard another whistle. I do not know which way to go. There are often times when we do not hear. In that way, we make our time up to the Shovelful and so on through the shoal. It is the constant fear that troubles me. I must go full speed again because I am crossing the tide again. We finally arrive at the Handkerchief, where you are relieved. You have fair conditions there.

I have made the trip through there for 10 years nearly, without missing one trip, except one day when I was sick, carrying passengers and freight. I have had these experiences many times. We have here to-day the captain of the *Yale*, and he can verify my statements. I will further show the conditions there. Suppose now, we are going from the west to Boston. We make the Handkerchief all right. We may have lost 10 hours waiting for the fog to lift. I am afraid of meeting tows more than I am off the shoals. I run along up to there [indicating] without stopping. My running time is 20 minutes. I run 18 minutes and hear nothing. I can not run one minute beyond the Shovelful. If I do, I am on the beach. I am afraid. I must judge as to what to do. I have had this experience many times. Aftwards I hear the lightship ringing. Her bell has been in a zone where I could not hear it. If I meet tows, I have to stop, of course. I had to get around there the best way I could. It is a case of another ring, full speed and I go across that damned slue, which everybody dreads. We are both cutting off here [indicating]. This is a condition which might occur every day with these fogs. You do not know where your heart is, you say: Your heart is in your mouth. I wish you could see where mine was. I was master of the *Orion* at this time, and was waiting for the sea to go down some. It went down and I started to go ahead and make my turn, and just then I saw a tow and another steamer. The tow and her barges were running wild and so was the steamer. I had to take a chance and start my wheel and turn between that steamer and Pollock Rip Lightship. I lost my bridge and my pilot house. My mate, who was a Norwegian, said "Jesus, Captain, we are going to eat sand." I could relate these experiences all day, because I have been crossing through there for 20 years.

STATEMENT OF CAPT. N. L. CULLIN.

Capt. CULLIN. I represent the marine departments of the trunk lines carrying 95 per cent of the tonnage of coal coming east. The companies which I represent, which are the Philadelphia & Reading Railroad, the Erie, the Delaware, Lacka-

Digitized by Google

wanna & Western, the Lehigh Valley, the New Jersey Central, and the Baltimore & Ohio, operate 23 tugs and 164 barges. Their business is entirely with the eastern ports. We go over these shoals 1,950 times a year; that is the record for the year 1910, closing June 30. We carried during that time 2,698,000 tons of coal over the shoals. We take three barges in tow. If we go loaded, we must come back light, so we simply double up our tows going both ways. The Reading Railroad alone ships from 140,000 to 170,000 tons of coal a month over these shoals. That is about 80 per cent of the coal taken into the eastern ports. I will not dwell, though I am a practical man in this line, on the question of digging a channel there, as you have other men here more familiar with that part of the question than I am. I want to say that the companies which I represent are much in favor of this project and are ready to assist in any way they can in order to straighten this channel across these shoals. We must go in and out as well as the steamers. We use the best caution we can, as well as they do. The sailing vessels also must use it. We have to contend with them, because we have a long tow. If it is thick, one flashes up possibly but a very few feet away from us, and it is a serious question very many times how to clear the tows, and it is a wonder that more steamships, schooners, and coal barges do not drop in going over these shoals than there is. I do not want to take up any more of your time. I will be glad to answer any questions you wish to ask.

Col. ABBOT. If you will file the figures you have there with the stenographer, I would like to have you do so.

Capt. CULLIN. Yes, sir; I will do so.

(Filed, marked "Exhibit No. 6," copy appended.)

STATEMENT OF CAPT. ALFRED ABBOT.

Capt. ABBOT. I represent the New England Coal & Coke Co., of Boston. We carry over 1,000,000 tons of coal across the shoals every year. Our ships draw 26 feet of water. We approve of this proposed channel. We generally use the Great Round Shoals Channel. We have a great number of delays going through there owing to the cross currents. We would like to have this other channel. It would minimize collisions.

Col. ABBOT. You go around the Great Round Shoal on account of your deep draft?

Capt. ABBOT. Yes, sir. We lose 24 hours often waiting for a chance to go through. We have been detained owing to the cross currents, and if you can not see 2 or 3 miles ahead you can not make it.

I have a number of letters here which I would like to read.

Col. ABBOT. If you will just give a brief statement of their contents and then file them with the stenographer, they will be duly considered.

(Gives synopsis of letters, filed, marked "Exhibit No. 7," copy appended.)

Col. ABBOT. Where does your coal come from?

Capt. ABBOT. From Virginia ports.

STATEMENT OF MR. GEORGE H. WOOLLEY.

Mr. WOOLLEY. I represent the Commercial Tow Boat Co., of Boston. Our company is engaged in carrying coal from Virginia ports to Boston. We carry from 150,000 to 175,000 tons of coal per year. Barges arriving at the shoals in a driving wind are handicapped for lack of water and endangered by collisions. Frequently vessels are headed off by the wind, and they are then obliged to anchor, mainly in the channel, which, as the channel is only three-eighths of a mile wide, with other vessels anchored in it, gives vessels passing through it very little room to work in. A new channel will greatly relieve this situation, as then, if the wind should die down, they will have room enough to anchor on either side, which they do not now have. We utilize over 22 feet of water. Great Round Shoal Channel is used almost exclusively. Tows are very often obliged to anchor there for the night, not daring to go out. When morning comes, the weather has changed. Much time is lost in this way. This channel would be a great benefit to every one using Nantucket Shoals.

STATEMENT OF CAPT. T. E. HAWES.

Capt. HAWES. I represent the International Steamship Co. I was born in Chatham and have been familiar with conditions down there since I was 9 years old. I have seen the channel change. I do not see any reason why the channel proposed would not be a nice channel. I have been on most of the towboats. When we want to go through there, we get tangled up with schooners, which puts us in a bad fix. We get tangled up with steamers, too. If they will dredge that channel out, it will keep clear

Digitized by Google

itself. The full strength of the tide runs that way. Of course, you get out of [illegible] with the wind northeast, and bound to New York, or farther south, and come [illegible] the Capes and you may get into a snowstorm. Not many want to go in through [illegible] they generally hold up. If you had a straight channel there, you could come [illegible] and go right on through. Now you can not do it. Last winter four schooners [illegible] lost there. I came down through the slue and was held up by two schooners [illegible] way up on my weather bow. I had to stop to let them go by. The next [illegible] three schooners were piled up on the Stone Horse Shoal. All hands were lost. [illegible] channel was there, they could have gone on down to the Handkerchief and [illegible] That is all I have to say.

STATEMENT OF CAPT. J. W. HAMMOND.

Capt. HAMMOND. I am superintendent for and representing the Staples Transportation Co. I was born and brought up in Chatham, and from boyhood have navigated in these shoals. The ground has been pretty well covered by the previous speakers. We send 350,000 tons of coal over these shoals yearly, two-thirds from southern and one-third from New York. I have noticed that the channel through Pollock Slue has deepened in 30 years, and it now remains fully as deep as it ever has. I saw for the first time this morning the chart showing where the proposed [illegible] would be, and I can not indorse it too strongly. I think it is the proper thing. Many disasters have occurred from the fact that the course has changed so much. [illegible] hardly realize, until we are in it ourselves, how great is the amount of danger [illegible] in the changing course down from the Handkerchief, going off nearly four points [illegible] way and then back nearly eight points to make these turns, involving the danger [illegible] cross tides and anchored and navigating shipping. We certainly approve this proposed channel.

STATEMENT OF CAPT. H. L. HOPKINS.

Capt. HOPKINS. I am secretary of the Pilot's Association in Boston and never come in contact with the majority of the men using this passage. I do not think there are any representatives here of one or two of the following concerns. I can say they are in favor of it. We have a number of light vessels running through there [illegible] and they want considerable room. The channel is rather narrow. The concerns I refer to are the Chesapeake Steamship Co. and, I think, the Metropolitan [illegible] They are heartily in favor of this proposed channel. I am in touch with the men [illegible] this channel. We endeavored to get through with 14 feet of water several years [illegible] now that same channel has from 20 to 22 feet of water, showing that it is growing [illegible] and not shoaler.

STATEMENT OF MR. J. M. CHERRY.

Mr. CHERRY. I represent the T Line for the Lehigh Valley Railroad Co. We [illegible] 34 barges which round Cape Cod, with 5 tugs. They haul 435,000 tons of coal annually. I can not speak from the standpoint of a navigating officer—only that of superintendent—but I do know from the reports of our navigating officers that it would be a great improvement to have this proposed channel, and I most heartily indorse it. We have here Capt. D. R. Chase, who will be glad to say something about the navigating end of the business.

STATEMENT OF CAPT. D. R. CHASE.

Capt. CHASE. I do not know as I could explain any more fully or clearly the conditions at that part of Nantucket Shoals than the gentlemen who have preceded me. They seem to have covered the ground pretty well, but having been probably in a different position at times than the rest of the officers, and having been in charge of the barges, which is particularly a unique position, I can say that I have been [illegible] a hawser, as they state, 200 fathoms long. At times we do have them of [illegible] length. At times we had only 75 fathoms. That matter is regulated altogether by the conditions. If it was a thick fog, the Lehigh Valley Railroad Co.'s barges would shorten our hawser before we got down to this channel. I have been through [illegible] as a master for 12 years, and was a native of Harwich, 7 miles north. I was over the shoals considerably, as a boy, fishing and otherwise.

I do not know where the money can be utilized to any better advantage than that new channel as proposed; I can not think of any other place, and have [illegible] expressed the opinion that when we get down to the Handkerchief and we turn out to Pollock Rip, it was a pity that this channel, which seemed to be a natural one, could not be straightened. I have seen the *Ralph M. Hayden* and the [illegible] *Miller* go across there. The straightening of the channel would, in my estima-

Digitized by Google

greatly reduce the dangers of collisions. Everyone who follows the sea will notice that on easterly winds the vessels are using Vineyard Haven, under Nobska Point; the wind holds them up for a few days, perhaps a week; and then the vessels congregate, and they meet in this narrow channel. I do not see how they ever do keep clear. They remind me of Capt. Charles Barr, who sailed the cup defender, jockeying around for position, only with this difference, their jockeying around was for the purpose of saving human life. I have heard some good things here to-day. There is lots to be benefited by this improvement that has not yet been seen or even thought of. Of course these tows coming down through there are enormous; they represent the big tonnage. We all know these barges must be towed on a hawser. I realize that the schooners seem to be more in the way than the steamers, having no propelling power of their own. This channel will open a direct line, and that is what we need at this time. I shall give my hearty cooperation to the movement and hope that the improvement will be put through.

Col. ABBOT. Is there anybody else who wishes to speak?

STATEMENT OF MR. CHRISTIAN E. METZLER.

Mr. METZLER. I represent the Philadelphia & Reading Transportation Line. We have in service 11 ocean tugs and 63 barges with a carrying capacity of 100,000 tons on a summer schedule, and a little less on a winter schedule, per month. We carry to New England 1,500,000 tons of coal annually; 300,000 tons goes to Bangor and the Penobscot River. We are heartily in favor of this channel. I know that from September 17 to 20 there were 20 tugs with from 40 to 60 barges anchored, storm bound, in the vicinity of Woods Hole and northwest of the Handkerchief, and I am of the opinion that they were there for two or three days, some of them. If this channel had been in operation they could have started along before they did and some could have gone right through, but they could not get around the lightships at Pollock Rip and Shovelful. The channel would have given them a straight course from the Handkerchief. Many of these boats, coming up that way, especially from the Penobscot River, go out to sea, leaving the cape 40 or 50 miles to the westward. The channel would give them a direct course and I believe if it were in operation it would prevent many of the delays on the shoals. I want to say for the Philadelphia & Reading Transportation Co. that we are heartily in favor of the improvement.

Col. ABBOT. I would like it if you could give me an estimate of the value of one day's delay for one of your tugs with a tow of three barges.

Mr. METZLER. I could better give that if I knew the freight rates on coal. The *Conostoga*, which is somewhat better than any of the rest, made 11 round trips between Philadelphia and New England and back in 78 days, with three barges each way. Sometimes she went to Boston only and sometimes she went as far as Fort Point. Our barges carry from 1,000 to 3,000 tons of coal each. They tow three of these barges and carry probably on an average from 4,000 to 5,000 tons of coal a trip. All things being favorable, they make that trip in three days one way and three days back. We allow 72 hours to come up and 65 hours to come home in fair weather. Often times we are held up four or five days. If a tow can handle from 4,000 to 5,000 tons of coal, bringing the loaded barges up here and taking the empty ones back in six or seven days, the delay of a day means a considerable. The rate for freight on the coal and the expense of running the tug would, of course, figure in it. I do not know what that would be. I am simply what a train dispatcher is on a railroad. I am given the barges and I ship them. The train dispatcher may not know what is in his cars or the rate of freight. It is the same way with me.

Hon. WILLIAM S. GREENE, M. C. I think Capt. Lavender can show the growth of the business and the change in freight rates.

STATEMENT OF CAPT. R. M. LAVENDER.

Capt. LAVENDER. In February, 1865, which, as you all know, was during the War of the Rebellion, we carried coal from Philadelphia to Portsmouth at $4.75 a ton; later it was $4.50, then $2.50. Now it is 60 cents. That is 15 cents over the Boston rates. That goes back to February, 1865.

I think, Mr. Chairman, as to the cost of delays, we have here Capt. Hammond and others who can give that almost to a penny. That channel would be one of the greatest things that ever happened to Boston for people going over these shoals. Capt. Hillary would not have to wait outside for 12 hours if he had a straight channel. That would enable him to navigate that channel on one side. He would know where to find his vessels; he could go through with perfect safety. The proposition as laid out here is

Digitized by Google

not much of an engineering problem. I do not think there is anyone more familiar with the question than Mr. Greene, at one time chairman of the House Committee on the Merchant Marine and Fisheries. This channel will banish the thought of collision. The Government would compel boats to keep to one side going in one direction and to the other side when going in the opposite direction. The only time there would be any danger would be when some man violates the rules, or a stranger gets in there. Capt. Hillary would know where he is going to find the ships and would have no trouble, either with his passengers or his company.

Col. ABBOT. Is there anybody else on that side who wishes to speak?

STATEMENT OF MR. GEORGE W. ELDRIDGE.

Mr. ELDRIDGE. I am George W. Eldridge, chart maker. I represent no one but myself and humanity—sailors. I came here to listen and to say a few words, perhaps.

For 50 years we have surveyed Nantucket Shoals. We have surveyed over Pollock Rip and vicinity 18 times. I was born at Chatham and know that country pretty well I have advocated this plan for more than 10 years. In fact, I believe it absolutely originated in my brain. I have published a book on the tides for 36 years, and for years I have written articles and printed them in that book annually on this very thing. Within 50 years there have been three channels formed in the vicinity of Pollock Rip. I have no doubt, in fact I believe, that all the sand forming Nausett and Monomoy Beaches and Monomoy Shoal comes from the highlands of Cape Cod. The storm waves wash it down and drive it along the shore, down, down, down, forming, as I say, Nausett Beach, Monomoy Beach, and Monomoy Shoal. Shoals are formed by tidal eddies and not by tidal currents. A snow bank is formed by an eddy, or a calm zone in the atmosphere, and sand works in the same way. When I was a boy, I was with my father the first day we threw a line there. The old ship channel was east south one-fourth south of the Fort Point Lightship. It then formed the slue. It broke through. In 1850 I went ashore dry shod on Pollock Rip exactly where this proposed channel is now being considered. In August of this year the depth there was 16 feet The second channel was the slue of Pollock Rip; the old channel filled up, then came the slue of Pollock Rip. I believe it has deepened from 16 to 24 feet by the action of the propellers of steamers. Some years ago I observed that the water began to deepen right through the main body of Pollock Rip—dry 50 years ago.

I have come to the conclusion that the third channel was being formed. All this sand comes down and turns off to the south. The main body of the current is west-southwest by east-northeast. That is about the lay of this proposed channel. That is the third channel that has been formed across these shoals within my recollection If dredging is done there now, that will take care of it for years undoubtedly. The channel is very narrow between the Stone Horse and the Shovelful. The Shovelful has been working off sand and narrowing up the channel, as the captains well know. I advocated years ago that the north end of Stone Horse Shoal be cut off. By this plan, you will give them a good, wide channel to approach Pollock Rip, and then with this channel across Pollock Rip it would be all right. As to collisions, for 40 years I have been employed as an expert as to collisions. Some 20 years ago William K. Vanderbilt's steam yacht *Alva*, valued at half a million dollars, was sunk in collision with the steamship *H. M. Dimock*, running between New York and Boston. I was in that case, and I have been on some cases of the Philadelphia & Reading Railroad Co. Many millions of dollars and many lives have been lost in this Pollock Rip Channel. Some years ago I wrote a little verse on the subject, reading like this:

"There is a coaster's hell,
And there is a coaster's heaven.
One is Pollock Rip
And the other is Vineyard Haven."

In regard to the Cape Cod Canal, I really do not consider that it enters into this matter at all. I have always considered it a fiasco and have opposed such a canal All practical mariners do also. I do not believe it will be used to any great extent, for many reasons not necessary to relate here. It has nothing to do with this matter. Vessels will continue to cross the Shoals. The American public desires this channel I do not know any part of the coast where so little money has been spent as Nantucket Shoals. The Government should spend millions of dollars there in aids to navigation and for mariners. They come here now and ask for our opinion. I believe in it, I approve it; it is the thing to do, and it is bound to come. They ought to have it; they deserve it, and I believe it is the thing to do.

Digitized by Google

STATEMENT OF HON. WILLIAM S. GREENE, M. C.

Representative GREENE. I have sat here and listened to the remarks made by the gentlemen who use the great water highway, which is as important certainly as any highway on the land, and we are improving highways on the land to-day, and everybody is moving forward in that direction. It so happens that I represent the district which embraces Nantucket, Vineyard Haven, and Marthas Vineyard, and at one time I represented all of Cape Cod. By the growth of the cities, Cape Cod slipped out of my district, and I presume now that Nantucket and Marthas Vineyard will also go in the next reapportionment. This matter is a national question. Some speak of its importance to Boston. It is important to everyone, to every man sailing the sea, whether foreign or domestic, or whether he has schooners, steamers, or barges. My mind went back, as I sat here, to the time I went to work in 1858 for a man in the wholesale coal business, and I thought of the freight rates in those days and of the size of the schooners and sloops compared with what they are now. When we got a 250 or a 300 ton schooner we were looked upon with astonishment at that date. We were bringing coal to New England. Now the sizes have gone up to 1,000 tons, and the stories told here to-day as to the amount of this commerce, if they are within the facts, would seem like romances.

It seems to me that this project ought to be reported upon favorably and acted upon favorably by the Congress of the United States. We hear in these days a great deal about conservation—conservation of our resources. The most important conservation of all is that of human life, the preservation of the lives of those who are born into the world, for the good of the world, as we believe. These children born into the world grow up into men and go down into this dangerous spot and their lives are sacrificed, as they have been—countless thousands of them, in that dangerous spot. That alone, if there was nothing else, never mind the question of the loss of vessels and cargoes, the loss of human life alone ought to make this measure sure. I am glad that this board has the matter under consideration. I happened to be the humble instrument that started it in Congress, and though I may not hereafter represent directly the district that it is in, indirectly I represent every district in the United States; there is no people or land from the Atlantic to the Pacific, from Alaska to the Panama Canal, and out to the Philippine Islands that I do not represent. I am prepared to advocate this project in every way, both before the committees and on the floor of Congress, and I say that this project is not one that affects New England alone, not Boston alone, but it affects every land and every sea and is a project so worthy that it ought to have the support of everyone, regardless of what conditions he may find in his own home or his views of the political questions of the day. It is a national project. I hope your board will report the subject fully and fairly, and I will be glad to examine the report when made. You should relieve the anxiety of these captains.

I have not seen very much of the world; I was never outside of our own land; sometime I hope to go across the ocean when I get money enough. The coming year I hope to go to the Pacific coast and see the Panama-Pacific Exposition. I want to see all I can. I realize that life has its limitations and that I have not many more years to live, but I was favored with a strong body and I hope to see a great deal more. To-day is the time to do this work; now is the accepted time, and with all the delays that come afterwards in getting appropriations and putting the thing through, we ought to lay the foundation for this improvement secure, and then build the structure, that all the men and all the women of the future generations will praise the work that we do here to-day. [Applause.]

Col. ABBOT. Is there anybody else?

Mr. CHERRY. I would say that our steamers carry between eight and nine thousand tons, our schooners between three and four thousand tons—our transportation company alone.

Capt. CULLIN. You asked the question as to the cost of delay. I say approximately $450 or $500 a day would be lost by a tug waiting to go through the Shoals. With one of our steamers, if delayed, her time is reckoned at 5 cents a ton a day, which would be about $400 for one day alone, if she were delayed 24 hours on Nantucket Shoals.

Col. MILLIS. I have made a memorandum of a few points I would like to ask some questions about. Having suggested to the chairman that he read them, and he having made some sarcastic remarks as to my penmanship, he then suggested that I read them myself.

Is there any information or opinion as to the number of days that the use of the Cape Cod Canal would probably be interrupted by ice?

Mr. SPINNEY. I can not tell you exactly as to the canal, but as to Cape Cod Bay, I have many times seen the bay filled with floating ice. Twice I have broken the ice in February. If it was frozen there, it would be frozen in Buzzards Bay. People in

Digitized by Google

that neighborhood can tell you. My experience is only with the drift ice which makes in Barnstable Bay. I received a telegram one time, many years ago, to remain in Boston and not try to go out because the ice was so thick. When I got through, there were eight or ten vessels in the ice, and a cutter was there to pull them out.

Col. MILLIS. Would it probably be an annual occurrence or one only taking place in extremely severe weather?

Mr. SPINNEY. I do not remember any winter when we did not have drift ice in Provincetown. Those gentlemen living on the other side of the cape could tell you.

Col. MILLIS. It would occur occasionally?

Mr. SPINNEY. I think so.

Mr. ELDRIDGE. Buzzards Bay closes up about six weeks a year on an average. Capt. Gibbs can answer.

Col. MILLIS. Only just a general idea is what I want.

Capt. CHARLES I. GIBBS. I live in Sandwich. The people engaged in building the canal do not report any delay on account of ice. Sometimes they can not get ice to put in their ice chest.

Col. MILLIS. Can anyone give the number of days a year that a seagoing suction dredge would be able to work out there; any sort of an approximate idea?

Capt. GIBBS. They worked there on the canal all winter last year, and I do not know why they could not do so all the time.

Col. MILLIS. I am speaking of the possibility of their working on the Shoals.

Capt. GIBBS. I think some of our big heavy dredges could work there.

Col. MILLIS. In all conditions of weather?

Capt. GIBBS. Under ordinary conditions.

Col. MILLIS. Would they lose as much as one-third of the time?

Capt. GIBBS. I hardly think so; perhaps 15 or 20 per cent.

Capt. R. M. LAVENDER. I believe a dredge could work there nine months a year under ordinary conditions.

Col. MILLIS. Now, reference was made to the difficulty of hearing the fog signals. Do they have the most modern signal apparatus?

Capt. HILLARY. That is a very serious matter. There seems to be zones where the sound can not be heard. It has happened in the last two months on two occasions. On the Shovelful there is a condition that exists that I can not account for. I made a complaint to the Light House Establishment once, and afterwards realized that I was mistaken. It was not the fault of the lightship. It was the condition of the atmosphere. You get in a zone where you can not hear or locate the bell.

Col. MILLIS. It is a bell, not a siren?

Capt. HILLARY. Yes; it is a bell. That is the most difficult thing of all. Should you pass by for one minute's time, you are ashore.

Col. MILLIS. Would the conditions be improved by a modification of the fog signal?

Capt. HILLARY. Yes, greatly; something like the Breton's Reef fog signal; that we can not mistake for Pollock Rip Shoal or the Dry Shoal. After a while we get accustomed to it, and if our time is not interfered with it does not bother us much, because we run on our time and are bound to hear the bell again. The Shovelful signal is not to be depended upon. The *Kershaw* came through there with an experienced man and, in waiting to hear the bell, passed the shoal. My time there is 20 minutes. I run 18 minutes; now you begin to get anxious. You can not go one minute beyond it; you do, you are ashore.

Col. MILLIS. With the channel, you would want the most efficient fog signal anyway?

Capt. HILLARY. Yes, sir.

Col. BURR. How does this sea run there, with the wind?

Capt. HILLARY. In a northeaster, usually with the wind. With the wind north-northwest they will sometimes run down the beach if it is blowing hard enough.

Col. BURR. How about the easter, or southeaster?

Capt. HILLARY. Yes; usually with the wind.

Col. BURR. In a northeasterly gale, the sea generally runs with the wind?

Capt. HILLARY. I usually find it so. When you make that turn, though, there is a cross sea?

Col. BURR. Then in northeast to southeast gales the sea runs with the wind?

Capt. HILLARY. Usually, except occasionally when you get a cross sea.

Col. BURR (to Capt. Chase). Is that your experience also, Captain?

Capt. CHASE. Yes, sir; that is my usual experience. The sea runs with the wind.

Col. MILLIS. These points I am bringing up haven't any sequence. I assume that in opening this channel, the point would be to get a hole through the Pollock Rip Shoals first. Would a narrower channel than that proposed be effective or be of any use? How wide would a channel have to be to begin to be of effective use?

Mr. SPINNEY. That is pretty hard to say. In conversation with the members of the Lighthouse Board, they agreed to move the lightships to a different position, and

Digitized by Google

put the Shovelful lightship down in the middle of the channel, leaving the Handkerchief light where it is. They would leave the buoys there and thus give us the fairway of the channel. If this channel was straightened three-eighths of a mile wide, it would be some improvement.

Col. MILLIS. By that time it would begin to be useful?

Mr. SPINNEY. Yes.

Col. MILLIS. If a narrower channel should be opened, after it were opened, would you expect to begin to observe any effect from natural scour on the north side of the Stone Horse Shoal in widening it there?

Mr. SPINNEY. But the proposition is to remove the Stone Horse Shoal.

Col. MILLIS. But the object would be to utilize any benefit arising from new conditions.

Mr. SPINNEY. I hope that if any action is taken, they will begin to remove the Stone Horse Shoal.

Col. MILLIS. You think that would be the most urgently needed?

Mr. SPINNEY. Yes, sir; the channel now being used is less than half a mile wide. If that part were removed, you would have removed the portion most in the way.

As to the signals on the lightships, the bells are not modern. The ships are not considered strong enough for the installation of steam whistles. The vessels are too old to warrant the installation of steam apparatus.

Capt. HILLARY. One reason for making that channel seven-eighths of a mile wide is on account of the tows. I have had quite a lot of experience in towing barges through there. We have been running towboats that can do 7 or 9 knots. We have three barges with a tugboat of 150 horsepower, and we go down across this channel, making a lot of leeway. You have got to allow for this tow. The stern barge is not following here in the path of the tug. There may be perhaps two or three tows coming and going, and that is why this channel should be seven-eighths of a mile wide at that point. The prevailing wind is northwest, which necessitates the tows sagging, and you must take that in mind in widening this channel at that particular point. After that, we have plenty of room. It is this place that troubles us. We want it widened. We must get in through there with the tows. I came down from Cleveland one time with a tow of barges with a whaleback steamer that could tow those barges 8 knots. When I got to Lake St. Peter, between Montreal and Quebec, there is a steamship channel. I have forgotten the width. I spoke to my pilot and said: "This time, two whistles. There is a big steamer coming up." "Oh, no; one whistle," he said. I could not understand French very well. When this steamer came near enough, she blew one whistle. Pretty soon the steamer came along. I was trying to keep my barges straight; and pretty soon the pilot on the steamer began to port, and she went upon the bank. I read in the papers later where she was still on the bank. Now, that is just what it means in this channel if you do not allow for these barges.

Col. MILLIS. The consensus of opinion seems to be that once this channel is opened there will be a decided tendency for it to maintain itself from currents and the passage of vessels. There may be a deterioration of the channel from filling. I would like to ask what the nature of that filling is likely to be. Will it be from sand drifting in from seaward, or from sand driving laterally across the channel, tending to narrow it?

Capt. HILLARY. In reply to that I would also like to add to what has already been said about the first digging of the Pollock Rip Shoal or the Stone Horse Shoal. The Pollock Rip Shoal is sand. The Stone Horse has a stony bottom, with some pretty large stone there. It might need a different kind of a dredge than a sand sucker. This is sand that has come down from Cape Cod. I was born and brought up in Chatham, and the house there has washed away. The ocean has reclaimed it. The scour of the sand is down the beach and not out to the sea, and Pollock Rip Shoal itself has not, in my estimation, moved to the seaward but very little.

Col. MILLIS. Would the sand be driven laterally from the northwest?

Capt. HILLARY. Yes, sir.

Col. MILLIS. There would not be a shoaling of sand across the channel on the easterly end?

Capt. HILLARY. No, sir.

Col. MILLIS. And as to this rock there in the Stone Horse Shoal; there is no ledge there, is there?

Capt. HILLARY. No, sir; it is loose stone.

Col. MILLIS. Would you expect to encounter in this channel many rocks?

Capt. HILLARY. I do not think so. There were some there a long time ago. The *Lancaster* was lost near the west end of that channel.

Col. MILLIS. Is there any gravel there?

Capt. HILLARY. There is no gravel on Pollock Rip Shoal, but there is gravel on the Stone Horse Shoal.

Digitized by Google

A GENTLEMAN. I can say that on the west side of Pollock Rip there is kelp grow on it.

Mr. ELDRIDGE. I think the first thing that should be done is to remove the s[illegible]ern end of Stone Horse Shoal. That can be done cheaply and quickly and would [illegible] more room there. I think that is the first thing to do—take off the northern e[illegible] Stone Horse Shoal. There are no rocks in the line of the proposed channel rocks are in the vicinity of the slue to the southward. There are no rocks, to my k[illegible]edge, above whatever. The sand coming down from the north gradually turns to the south and forms that line of shoals. No sand would come from the seaw[illegible] but from the beach. Nature has already formed a channel there, and all that is n[illegible] is to deepen and straighten it.

Col. ABBOT. I will now read a letter received from Mr. Edgar F. Luckenbach (Reads letter, marked "Exhibit No. 8," copy appended.)

Now, is there anyone to be heard as presenting reasons against the construc[illegible] this channel?

STATEMENT OF MR. CHARLES M. THOMPSON.

Mr. THOMPSON. I come from Sandwich, and represent the sentiment of the p[illegible] of the cape. I am not here to oppose this very wise movement, but do not wa[illegible] to so overshadow the benefit that will accrue to seafaring men by the construc[illegible] the Cape Cod Canal that that work will be lost sight of.

Col. ABBOT. The board has nothing to do with anything, except the construc[illegible] this channel.

Mr. THOMPSON. The only point I wanted to make was that I do not want [illegible] improvement to so far overshadow the canal that it will be forgotten.

STATEMENT OF CAPT. CHARLES I. GIBBS.

Capt. GIBBS. I represent the town of Sandwich and the Sandwich Board of T[illegible] I am not prejudiced. I have worked for the Government for the last 27 years [illegible] the great fleets of the United States Navy went across Pollock Rip Shoals the Se[illegible] of the Navy asked me to take them across. First, there was Admiral Walker [illegible] And then later came the great squadron under Admiral Gherardi, with the Pr[illegible] of the United States and several members of his Cabinet on board. I have li[illegible] the light vessel since 1870. I have a letter from Admiral Schley, which says th[illegible] knowledge of the shoals is greater than that of any other man that lives. Now [illegible] not prejudiced against this improvement, but there have been misstatements [illegible] here to-day. They say the channel has not changed. When I first came th[illegible] channel was a mile to the south of where it is now, running east-southeast of the [illegible] the broken part of Pollock Rip Shoal. I surveyed out to Chatham where the t[illegible] now. I assisted the coast survey in marking every shoal east of Nantucket [illegible] South Shoal. I hold that the tides at Pollock Rip do not follow the course [illegible] channel. I agree with the other gentlemen as to the difficulty of navigating [illegible] but the tides do not follow the channel. The tides go across the channel. The b[illegible] is blue clay and these shoals are not drifted sand. Of course, you can dig a ch[illegible] through there.

I hold that the United States engineers can build a channel anywhere, if they w[illegible] to. This channel is very much like putting a channel through the sea. The b[illegible] is soft. The sand that first touches the clay makes a hard surface of it. I have se[illegible] on every rock and on every shoal that there is there. I believe entirely in the [illegible]ests of these people. The danger has not been over estimated at all, but the [illegible] with which a channel can be made will be found different from what people ex[illegible] Where a narrow sandbank piles up in the vicinity of these shoals, the tide runs a[illegible] it. The sand goes across. Another thing I want to say for the people of the to[illegible] Sandwich is that they hold and I hold that the dangers and inconveniences of P[illegible] Rip Shoals are ten times what they would be in going up through Buzzards Ba[illegible] going through the canal up to Sandwich. I hold that 25 feet of water will be c[illegible] through there with great ease. This great detention down there from fogs w[illegible] obviated by the canal. It would save vessels and save lives. More vessels co[illegible] grief on the western end of Vineyard Sound and on the end of Cape Cod than [illegible] other part of the coast of the United States. I was born in Chatham, and thou[illegible] ice forms on the Chatham Bars, it gets about the thickness of the rise and fall [illegible] tide and it goes off and goes across Pollock Rip Channel and takes everything be[illegible] Nothing can withstand it. The ice breakers can break solid ice, but they can [illegible] through that drift ice, 5 feet thick. I am not speaking against the need of this [illegible] If Pollock Rip Channel is to be used there is no place that needs work done any [illegible]

Digitized by Google

than Pollock Rip Channel. The atmosphere does not carry the sound of the bells there. They sound sometimes as if they were over your head, or else you do not hear them at all. As far as the shoal shifting is concerned, I can say that the whole of Stone Horse Shoal is built up from one rock about the size of this table. There was a rock there as big as this table and from that rock the whole collection of sand arises.

Col. ABBOT. What depth of water is there over this blue clay?

Capt. GIBBS. The blue clay is covered over with sand.

Col. BURR. You do not get blue clay until when?

Capt. GIBBS. You get it at 6 or 7 fathoms. That blue clay is very soft.

Col. ABBOT. Do you think we would be apt to hit any of that blue clay in dredging to 20 feet depth?

Capt. GIBBS. I do not know. The drift of ice can only be obviated by deepening the channel down to Sockanessett. I have been there one winter when no steamers went through the sound. All went around the South Shoals. I have seen plenty of steamers ashore to the southward of Chatham, carried by the ice. The solid ice can be broken up by an ice breaker and you can get through, but this drift ice, no steamer can get through.

Col. ABBOT. Are you the master of the light ship now?

Capt. GIBBS. No, sir; I was retired three years ago at my own request.

Capt. HILLARY (to Col. Abbot). May I ask the Captain a question?

Col. ABBOT. Certainly.

Capt. HILLARY (to Capt. Gibbs). How many times have Nantucket Shoals been frozen over so that steamers could not go through?

Capt. GIBBS. Nearly one month, one winter.

Capt. HILLARY. You spoke about Buzzards Bay and the Cape Cod Canal; you would break the ice there?

Capt. GIBBS. Yes, sir.

Capt. HILLARY. And where would it go when you broke it?

Capt. GIBBS. It would go out on the tide.

Capt. HILLARY. You appear to be in opposition to this project?

Capt. GIBBS. No; I am not in opposition to this project, but if there is a relief by another channel which will obviate the fogs and other dangers, why not use it? Fogs on Stone Horse Shoal sometimes lie there all day, up and down, like a wall. They do not go into Vineyard Sound, as you all know. They go over and sometimes do not come into Buzzards Bay for all day. I wrote an opinion on fogs for the Bureau of Navigation at Washington, and they complimented me on my opinion.

Mr. SPINNEY. The captain said the Stone Horse Shoal was formed on a rock as large as that table?

Capt. GIBBS. It commenced. It has sand on top.

Capt. HILLARY. Would you prefer a channel 300 feet wide, 27 miles long, or would you prefer a broad, open channel?

Capt. GIBBS. A broad, open channel, by all odds.

Capt. LAVENDER. Is it not true that steamships have not much difficulty in going over the shoals now on account of ice?

Capt. GIBBS. No; but the fogs are a greater objection than the ice. Years ago they had to stop. Years, years ago. For 27 years I have lived on the shoals and had whole charge of the light ship.

Capt. LAVENDER. Now, they have no great difficulty from ice. To Capt. Hillary: Now, how often have you been detained by ice, Capt. Hillary?

Capt. HILLARY. I have not lost a trip in 10 years, except when I was sick, as I stated before. I have never lost 20 minutes on account of ice.

Capt. GIBBS. I went through, too, but I did not take the channel you propose to take.

Mr. ELDRIDGE. I desire to ask Capt. Gibbs a question.

Col. ABBOT. I fear this discussion is getting away from the object of this hearing.

Mr. ELDRIDGE. I shall keep right to the point, Colonel. To Capt. Gibbs: Do you know the difference in distance between the route by the canal and that by the channel?

Capt. GIBBS. I do not.

Mr. ELDRIDGE. It is 47 miles.

Col. ABBOT. The subject of the canal is not before this meeting at all. If nobody else wants to be heard on that side, I have a letter here to read.

(Reads letter of Sandwich Board of Trade, marked "Exhibit No. 11," copy attached.)

Likewise I have a letter from the Cape Cod Construction Co., dated October 16, 1911, which I will read.

(Reads letter, marked "Exhibit No. 12," copy appended.)

Digitized by Google

That is all I have in writing, and if no one else has anything further to present the meeting is adjourned. I am very much obliged to everyone for coming here and giving us the information you have, which will receive careful consideration.

Adjourned.

(Capt. Gibbs left on the table a letter, marked "Exhibit No. 9," copy appended and a petition, marked "Exhibit No. 10," copy appended.)

Note inserted in the minutes by direction of Col. Abbot.—After the hearing was completed one of the sea captains informed a member of the board that when his c. was boarded by a sea in passing through the Nantucket Shoals it was frequently the case that sand brought in by the water was found on the deck.

Exhibit No. 1.

Boston Chamber of Commerce,
October 17, 19::

Whereas the present channels constituting the eastern entrance to Nantucket So are so tortuous that vessels, going around the cape in either direction are al certain to encounter head winds on one of the legs of the triangular course pursue; and

Whereas the sharp turns that have to be made around the Pollock Rip Light V and the Shovelful Light Vessel on the Pollock Rip Slue Channel, or around Great Round Shoal on the outer channel, subject vessels to grave dangers of co and of losing their bearings in fog or stormy weather; and

Whereas, as a result of these conditions the loss of life in these waters has been app and the loss of property equivalent to the return of millions of dollars, and pr annually greater than the cost of dredging a proper channel: therefore be it

Resolved, That the Boston Chamber of Commerce strongly urge that appr legislation be enacted for the straightening of this channel as per plans propo benefits of the plans being, first, the saving of human life, the value of which ca be measured; second, the saving of an immense amount of property; third, the ing of great economies through the shortening of the route and through the minim of delays caused by necessity of anchoring both sail and steam vessels when ca in unfavorable weather in these dangerous waters.

Exhibit No. 2.

Boston Chamber of Commerce,
October 17, 19::

Be it resolved, That the president be asked to appoint a committee of two to pr this resolution to the department and to request its adoption with all the urgen their command.

In accordance with the above the president appointed Capt. Crowley and M William C. Brewer.

Exhibit No. 3.

Capacity of the vessels of Coastwise Transportation Co.

	Ton
Steamers:	
Coastwise	6
Transportation	6
Suffolk	7
Schooners:	
William L. Douglas	6
Geo. W. Wells	4
Samuel J. Goucher	4
Van Allens Broughton	4
George P. Hudson	3
Margaret Haskell	3
Marcus L. Urann	3
Henry W. Cramp	2,88

Digitized by Google

EXHIBIT No. 4.

Mr. S. R. Crowell, Boston, Mass.
Messrs. Crowell & Thurley, Boston, Mass.
Messrs. Rogers & Webb, Boston, Mass.
J. S. Emery & Co. (Inc.), Boston, Mass.
White Oak Transportation Co., Boston, Mass.
Metropolitan Coal Co., marine department, Boston, Mass.
Coastwise Transportation Co., Boston, Mass.
Mr. J. A. Middleton, vice president Lehigh Valley Railroad Co., New York, N. Y.
Mr. C. L. Hollis, superintendent marine department, Central Railway of New Jersey, New York, N. Y.
Mr. Geo. E. Hubbard, NEA, Ontario Central Dispatch, Boston, Mass.
Capt. John M. Merry, manager marine department, Delaware, Lackawanna & Western Railway, New York, N. Y.
The Harper Transportation Co., Boston, Mass.
New England Gas & Coke Co., marine department, Boston, Mass.
Mr. J. A. Collins, port agent Clyde Steamship Co., Boston, Mass.
Mr. L. Wildes, port agent Ocean Steamship Co., Boston, Mass.
Mr. Calvin Austin, president Metropolitan Steamship Co., Boston, Mass.

EXHIBIT No. 5.

Introduction.

BOSTON MARINE SOCIETY.

One of the oldest incorporated societies in the country (incorporated in 1754) and one that has always taken a deep interest in any movement that will benefit the sailor or commerce at large, as its records will show, commencing as early as 1759, when observations taken on Georges Banks were recorded, printed in the public papers at the society's expense; and so on, year after year, up to the present time as many, many extracts from their records will show. These same actions have not been taken from any direct financial interest, but from its interest in human lives and for the benefit of the general public.

The society now has upward of 400 members, seven-eighths of the same being shipmasters, active or retired, and the following extracts from the records will show the action of the society on this present question, a new channel over Nantucket Shoals.

[NO 1. EXTRACTS FROM THE RECORDS OF THE BOSTON MARINE SOCIETY.]

[May 12, 1908.]

A chart of Nantucket Shoals was laid before the meeting, with a plan marked on the same, for the straightening and improving of the channel.

Voted that the society approve the plan and that the president appoint a committee of three, to lay the plan before the necessary authorities to act on the same. Same date the president appointed the following committee: Capt. John Crowley, Capt. Robert M. Lavender, and Capt. John L. Manson, secretary.

[July 14, 1908.]

A petition to improve the channel over Nantucket Shoals was laid on the table until the annual meeting in November. (The annual meeting has much the largest attendance.)

[Nov. 10, 1908, annual meeting.]

The committee on the improved channel over Nantucket Shoals made the following report:

On May 12, 1908, a chart with a proposed improved channel (marked on the same) over Nantucket Shoals was laid before the society; arguments were made for and against the plan.

The society voted to approve the plan, and that the president appoint a committee to lay the plan before the necessary authorities who would have charge of such a work.

The president appointed the following committee: Capt. John G. Crowley, Capt. Robert M. Lavender, Capt. John L. Manson.

Your committee called upon the United States engineer for this district, Maj. Burr, in regard to the proposed channel; he said that he had no power to approve or object

Digitized by Google

to any plans proposed for improvements, in fact, he said, they were instructed not to express any opinion until asked by the Government; but he told your committee that the first thing to do to forward the proposed improvement, was, to draw up a petition, get as many signers as convenient or necessary, and have the same presented at the next Congress. Your committee drew up the following petition:

"BOSTON, *July 1, 1908.*

"*To the Honorable Senate and House of Representatives,*
Washington, D. C.

"GENTLEMEN: Because of the large amount of commerce that passes through Vineyard and Nantucket Sounds, and also because of the great increase in size, during recent years, of the vessels navigating those waters, and also because of the much added dangers and delays in thick and foggy weather, in sailing through a crooked channel, with sharp turns; therefore, we, the undersigned, merchants, shipowners, pilots, insurance companies, marine societies, etc., do here respectfully petition the United States Government to make the following changes in those waters, provided that the United States engineers believe such a plan feasible, and that the same can be maintained at a reasonable expense:

"As follows: Commencing at the Handkerchief Light Vessel, provide a channel seven-eighths of a mile wide, about 9 miles long, and 35 feet deep, running in a straight east-northeast (magnetic) direction, with the said light vessels, *Handkerchief*, *Shoreful*, and *Pollock Rip* in a straight mid-channel line.

"Probably three-quarters or more of the proposed channel has now the necessary depth of water, and the remainder has one-half or more of the required depth."

Several copies of the above petition were typewritten and circulated, and a copy was presented to the trustees at their July meeting, and the committee made a verbal report of progress. It was then voted to refer the same to the August meeting of the society.

At that meeting the society voted to lay the matter on the table until this, the annual meeting.

JOHN G. CROWLEY,
JOHN L. MANSON,
ROBERT M. LAVENDER,
Committee.

Several copies of the petition were presented at the meeting November 10, 1908, signed by many masters, pilots, and mates navigating those waters. After some argument it was voted that the president and secretary be empowered to sign the said petition in the name of the society.

[Dec. 8, 1908, trustee meeting.]

The following letter was read, received and approved, as an additional report from the committee on Nantucket Shoals.

BOSTON, *December 7, 1908.*

Hon. WILLIAM S. GREENE, M. C.,

DEAR SIR: Inclosed please find a petition to Congress asking (if such an undertaking is feasible) for an improved channel over Nantucket Shoals.

We have several copies of the within petition, signed by more than 150 captains, mates, and pilots, who are very familiar with the navigation over the shoals. Those petitions can be forwarded to you at any time that you may wish.

We trust you will give the petition due consideration, and also inform us if we can do anything more to forward the matter.

Respectfully, yours,

JOHN G. CROWLEY,
ROBERT M. LAVENDER,
JOHN L. MANSON,
Committee from Boston Marine Society.

[Trustee meeting, Oct. 10, 1911.]

A notice from the daily papers was read of a meeting to be held in Newport, R. I., on October 18, 1911, in regard to a proposed channel over Nantucket Shoals.

Voted, that Capt. Leslie A. Spinney, a member of the Boston Marine Society, be authorized to represent the society at the above hearing in favor of the proposed channel.

The foregoing extracts are true copies of the records of the Boston Marine Society.

JOHN L. MANSON, *Secretary.*

BOSTON, *October 11, 1911.*
[SEAL.]

Digitized by Google

EW CHANNEL ACROSS THE MONOMOY SHOALS—WAR DEPARTMENT CONSIDERING THE ADVISABILITY—ENGINEERING DIVISION WILL HOLD PUBLIC HEARING ON MATTER OCTOBER 18, AT NEWPORT.

NEWPORT, R. I., *October 2.*

Col. Abbot, Col. Millis, and Lieut. Col. Burr, connected with the engineering ivision of the War Department, will on October 18 hold a public hearing to consider ie advisability and necessity of constructing a channel across Monomoy Shoals at ie eastern entrance of Nantucket Sound by the removal of the northerly end of tone Horse Shoal and such portions of Pease's Shoal and Pollock Rip Shoal as may e necessary.

The hearing, which is held by direction of the War Department, will be at Newport.

JULY 2, 1908.

MARINE SOCIETY WANTS SHIP CHANNEL IMPROVED.

In order to have the Government make needed improvements in the ship channel hrough Vineyard and Nantucket Sounds a committee of the Boston Marine Society esterday decided to prepare petitions for circulation among the chief vessel owners nd water transportation companies here. This committee had previously called on Maj. Burr, in charge of the United States Engineers at this port, and he stated that whatever was done must come from Washington direct.

The petition will ask that "commencing at Handkerchief Light Ship, there shall e a channel seven-eighths of a mile wide and about 9 miles long, with a uniform lepth of 30 feet, running straight east-northeast, magnetic direction. Probably hree-quarters or more of the desired channel has now the necessary depth and the emainder one-half or more of the required depth."

Shippers stand as a unit behind the petition that will shortly be forwarded to the War Department.

MARINE SOCIETY FAVORS CHANNEL—EVERY SKIPPER AND PILOT RUNNING THROUGH VINEYARD SOUND SIGNS PETITION FOR IT.

The Boston Marine Society, at its annual meeting held yesterday afternoon in the reading room of the chamber of commerce, voted to indorse the proposed channel over Nantucket Shoals. Every ship captain and pilot running through Vineyard Sound has signed the petition asking that Government engineers be set to work on the matter, and it is believed that an appropriation will be asked from the coming session of Congress covering the work of deepening the channel.

EXHIBIT No. 6.

NEWPORT, R. I.

Number of tows over the shoals by the companies I refer to equal 1,950, year ending June 30, 1911. Coal carried by these companies year 1910, 2,698,712 tons, Philadelphia.

Reading Co. averages about 150,000 tons month. These companies operate their tugs and barges between Philadelphia, New York, and the eastern ports.

N. L. COLLINS.

EXHIBIT No. 7.

NEW ENGLAND COAL & COKE CO.,
October 12, 1911.

DEAR SIR: Yours of the 5th instant at hand and contents noted. With regard to deepening the channel between Bearses Shoal and the Pollock Rip Shoal and removing the northern part of Stone Horse Shoal, making a straight channel of seven-eighths of a mile wide from Handkerchief Light Vessel to No. 3 Whistling Buoy, would be, to my opinion, a great advantage and benefit to shipping and navigation, shortening the distance 4 miles then by way of Pollock Rip and the slew, and especially in thick and foggy weather collisions could be more easily avoided, as steamships and tows would

Digitized by Google

be meeting end on, and as the current would run parallel with the channel, it would make it more easily to steer a correct course. Hoping before long to see this channel with a depth of not less than 35 feet at low tide is the wish of your obedient servant.

E. J. GILES,
Master S. S. "Everett."

Mr. CHAS. SKENTELBERY,
Marine Superintendent.

—

NEW ENGLAND COAL & COKE CO.,
October 13, 1911.

DEAR SIR: I am in receipt of your letter of 5th instant with chart of Pollock Rip Shoals, showing the proposed dredged channel as recommended by the pilots' association, and in reply would say that I am heartily in favor of dredging this channel, provided it would be lighted up enough, as the tide at times runs crossways on it, and it would be hard to make a course.

Generally, I think this channel would be a benefit to navigation.

Yours, very truly,

WM. H. SMITH,
Master S. S. "Malden."

Mr. CHAS. SKENTELBERY,
Marine Superintendent, New England Coal & Coke Co., Boston, Mass.

—

NEW ENGLAND COAL & COKE CO.,
October 10, 1911.

DEAR SIR: Your esteemed of the 5th instant, in which followed an inclosed chart of the proposed channel at Pollock Rip in my possession and carefully considered.

In response to your request regarding my opinion of such an undertaking, I beg to say I think the channel can be dredged without any great difficulty from the mariner's point of view. The direction of the channel as planned is very favorable, as the tides will run chiefly almost in the channel direction, and I do not believe that neither storms nor tides will seriously menace the channel when it is first settled down after the dredging.

The proposed channel will, in my opinion, be of the best value to the commerce of Boston and other eastern cities if it is dredged to a depth of 35 feet at mean low water. This depth will allow large and deep draft vessels, which now exist and which we may look forward to see in the future on this coast, to navigate in safety and without the risk at present taken.

I would also say that the channel at Cross Rip should be made equally suitable for large vessels, as this with the channel as proposed at present would make the Vineyard Sound route the shortest, safest, and best route between the large cities of the East coast.

Yours, very truly,

PETER FROSTEAD,
Master S. S. "Melrose."

Mr. CHAS. SKENTELBERY,
Marine Superintendent, New England Coal & Coke Co., Boston, Mass.

—

BOSTON, MASS., *October 13, 1911.*

DEAR SIR: In reply to your letter of October 5, regarding the proposed channel at Pollock Rip, I would say that, in my opinion, this channel can be dredged without any great danger of filling up.

The channel as at present is very irregular and dangerous for deep-draft vessels, and I think the proposed channel would prove of great benefit to all classes of shipping.

The tide at this point would run chiefly in the channel.

Yours, truly,

AARON WALL,
Master tug "Mercury".

Mr. CHAS. SKENTELBERY,
Boston Towboat Co.

Digitized by Google

BOSTON TOWBOAT CO.,
Boston, Mass., October 14, 1911.

DEAR SIR: Having been asked my opinion on the proposed channel over Nantucket Shoals, from Handerchief Lightship down over Bearses Shoal, with what experience I have had at that particular place I would say that the idea is a capital one and should be approved by all seafaring men having occasion to navigate Nantucket Shoals, as the channel would be straight, doing away with sharp turns and also the cross tides one get going through Pollock Rip Slue. It would tend to greatly lessen the dangers of collisions, which frequently occur between Handkerchief and Pollock Rip.

In my opinion the chances of it filling in would be very small, as the tide would run nearly straight through.

Hoping it will meet with success, I am, Respectfully, yours,

MORTIMER NICKERSON,
Master tug "Orion".

MR. CHAS. SKENTELBERY,
Marine Superintendent,
New England Coal & Coke Co., Boston, Mass.

BOSTON TOWBOAT CO.,
Boston, Mass., October 14, 1911.

DEAR SIR: In regard to the proposed channel from Handkerchief Lightship in a east-northeasterly direction to Pollock Rip whistling buoy, I would beg to state that it has always been in my mind and judgment as a practical thing and a channel that would keep itself clear, as it is the natural flow of the tide in both stages of the turn, and having been in this particular place many times with difficult tows, the weather conditions and fog at this place being about the worst on the coast. I would strongly recommend the dredging of the channel as proposed from off Handkerchief Lightship to Pollock Rip whistling buoy, and will say it is the much talked of improvement by all the seafaring men of my acquaintance and looked forward to with much interest by us all.

Hoping to see this improvement in the near future, I beg to remain,
Yours, truly,

Capt. JOSEPH I. KING,
Boston Towboat Co.

MR. CHAS. SKENTELBERY,
Marine Superintendent,
New England Coal & Coke Co., Boston, Mass.

EXHIBIT No. 8.

NEW YORK, *October 17, 1911.*

DEAR SIR: I beg to advise you my vessels carry many thousand tons over Nantucket Shoals each year, and if you would make the improvement suggested in your circular of October 13 it would be a great benefit to all those engaged in coastwise business east of New Bedford.

I trust your board will approve of constructing the channel across Monomoy Shoals.
Yours, truly,

EDGAR F. LUCKENBACH.

Col. FREDERIC V. ABBOT,
Corps of Engineers.

EXHIBIT No. 9.

SANDWICH BOARD OF TRADE,
Sandwich, Mass., October 13, 1911.

DEAR CAPTAIN: I have your favor of yesterday, the 12th, and hereby hand you the authority of the board of trade of Sandwich to represent them before the United States engineers at Newport on Wednesday, the 18th, and I am in hopes to go myself to Newport and also to get George T. McLaughlin to go with me. Unless you hear from me to the contrary, I will call for you at Mattapoisset on Wednesday morning

Digitized by Google

with the auto and take you with me to Newport. We ought to get there in time if we start early enough from here. We will leave here, probably, about 6.30 a. m., and I will bring along with me the signatures of citizens here authorizing you to represent them.

Yours, truly, CHAS. M. THOMPSON.

Capt. CHAS. I. GIBBS,
Mattapoisett, Mass.

EXHIBIT No. 10.

SANDWICH, MASS., *October 16, 1911.*

DEAR SIR: We, the undersigned, residents of Sandwich, and having the interest of the town at heart, would be pleased to have you represent us at the hearing to be held on Wednesday, the 18th, at the United States engineer office in Newport, R. I., and protest against the outlay of a large sum of money contemplated in the improvement of the Pollock Rip Channel and urge upon the board the necessity and desirability of having the Government investigate the advisability of building additional breakwater at the mouth of the Cape Cod Canal, in Barnstable Bay, to provide a harbor of safety for coastwise vessels between Barnstable Bay and Vineyard Sound, and to erect such other aids to navigation as may be deemed advisable.

FLETCHER CLARK,
EUGENE S. CLARK, *Jeweler*,
SANFORD I. MORSE, *Merchant*,
(And 13 others).

Capt. CHARLES I. GIBBS,
Mattapoisett, Mass.

EXHIBIT No. 11.

SANDWICH BOARD OF TRADE,
Sandwich, Mass., October 9, 1911.

DEAR SIR: We have heard that there is to be a hearing at Newport, R. I., on the 18th of this month regarding the policy of deepening the Pollock Rip Channel by the Government. We have also been informed that it will cost an outlay of about $3,000,000 to do this work.

We feel, that as the Cape Cod Canal is now an assured fact, that it would be for the interest of the Government to investigate the policy of building a breakwater at the Barnstable end of the canal parallel to the shore, which, in connection with the breakwater constructed by the canal company, would make a sure and safe harbor of refuge, and that, in connection with the canal, would make a safe channel for all vessels plying between New York and Boston at all seasons of the year, and we feel that the Government should take the matter up.

It is the intention of our board to have a representative at the hearing on the 18th to advocate this work being done.

Yours, very truly, CHAS. M. THOMPSON,
President.

Col. FREDERIC V. ABBOT,
Corps of Engineers.

EXHIBIT No. 12.

CAPE COD CONSTRUCTION CO.,
New York, N. Y., October 16, 1911.

SIR: A business engagement of importance will prevent me from attending the meeting of the board upon the question of deepening Pollock Rip Channel, which is to be held at Newport on Wednesday, October 18. As I can not be present, I respectfully request that this letter be read and filed as a protest against doing any dredging in that locality at the present time.

1. The Cape Cod Canal will be finished in two years, and will afford a 70-mile shorter passage between all points on our southern coast and those to the eastward of the cape.

2. It will save an average of two days' time between such points by reason of the fogs and storms incident to the Vineyard Sound route.

Digitized by Google

3. It will eliminate the dangers to life and property incident to the passage around Cape Cod.

4. The Government, and especially your office, has the record of the numerous wrecks during the past 30 years on Nantucket Shoals, and humanity demands the elimination of that graveyard of ships rather than the so-called improvement of a channel which can not be maintained in the shifting shoals of Monomoy Point.

5. The expenditure of millions for deepening such a treacherous passage and maintenance thereafter seems to the writer a useless tax to impose upon the people of this country, provided the corporation which I have the honor to represent succeeds in their endeavor to create a safe and mobile passage through the Cape Cod isthmus.

Therefore, to repeat, and finally, I respectfully urge that no action be taken in the matter for the present.

Respectfully,

J. W. MILLER,
Vice President.

Col. F. V. ABBOT,
Corps of Engineers.

EXHIBIT No. 13.

MERCHANTS & MINERS TRANSPORTATION CO.,
Baltimore, October 20, 1911.

SIR: I attach hereto statement which you asked me to submit in connection with the proposed channel over the Pollock Rip Shoals.

Yours, truly,

J. M. BLANKENSHIP, *Superintendent.*

Col. FREDERIC V. ABBOT,
Corps of Engineers.

EXHIBIT No. 14.

The Merchants & Miners Transportation Co. has 18 sailings per week into and out of the port of Boston, making 936 times, year in and out, that ships of this company go over the dangerous Pollock Rip Shoals. This is at the rate of going over this course two and one-half times each day of the year.

While this company has a fleet of 25 freight and passenger steamers, 6 of them are used on the line between Boston, Norfolk, Newport News, and Baltimore, and 3 on the line between Boston and Philadelphia, the ships being as follows:

	Tons.		Tons.
Gloucester	2,541	Nantucket	2,599
Grecian	2,872	Ontario	3,082
Howard	3,581	Persian	2,677
Juniata	3,312	Quantico	2,676
Kershaw	2,599		

All of these ships carry both passengers and freight.

APPENDIX II.

FACTS REGARDING WINDS DERIVED FROM THE UNITED STATES WEATHER BUREAU RECORDS AT NANTUCKET.

It is unfortunate that the weather bureau records at Nantucket do not cover anything like as long a period of time as the surveys available for discussion. These records began in 1887, and have been discussed only through December, 1910. For the three years, 1893, 1894, and 1895, the wind record was kept in such detail as to make it possible to tabulate the total wind travel in miles for each direction, north, northeast, southeast, south, southwest, west, and northwest. In Table A the total indicates that for these three years the actual travel of the atmosphere was greatest from the northeast toward the southwest and that the average miles per hour for the three years was also greatest in this direction. A more prominent fact is that, from the most easterly quadrant, there was a tremendous preponderance of atmospheric travel and, likewise, that the winds from the easterly quadrant had a very much higher average velocity than those from the westerly quadrant. The assumption that waves would have a

Digitized by Google

transporting power for sand corresponding to the total travel of winds by which they are caused is not tenable as a general statement, for it is beyond question a fact that a gentle wind blowing for a long period of time will result in a great number of miles of wind travel, without developing force sufficient to move sand lying below the water surface as deeply as the material in Pollock Rip Shoals. On the other hand, the fact that the average velocity in miles per hour of the winds from the easterly quadrant exceeds that from the westerly quadrant bears with it the conclusion that heavier waves were undoubtedly caused by the winds from the easterly quadrant. For the years other than the three discussed in this table, the weather bureau records only show the highest velocity attained during each month by any wind and its direction and maximum velocity. (See Table B.) From these records, Tables C, D, E, and F have been prepared. Table C shows for each year the months and directions of the winds which attained maximum velocities excluding all in which the maximum velocity was less than 22 miles per hour. As in the case of Table A, it is found that the winds from the easterly quadrant very greatly exceed in force those from the westerly quadrant. It is not an unreasonable assumption that winds of 20 miles an hour would cause waves sufficiently high to create a considerable sand movement. The indication of this table is, like the preceding, that a movement of sand from Pollock Rip Shoals into the channel in question might be anticipated as a result of such winds.

Table D is similarly compiled, excluding all winds of less than 35 miles per hour; it is certain that winds of such strength would move large quantities of sand. The prevalence of the northeast high winds becomes more apparent than before. The average velocity of the northeast winds under consideration was 49.5 miles per hour, and the number of times in the 24 years that the velocity of winds is recorded which exceeded 35 miles an hour when blowing from the northeast was 84.

Table E, similarly compiled, includes only those winds in excess of 45 miles per hour. The prevalence of the northeast winds in number and in miles per hour is again shown.

Table F has been compiled to show those winds which exceeded 55 miles per hour in the 24 years, and the northeast wind is again greatly the largest.

As the Tables C, D, E, and F cover a period of 24 years, and as their indications are accordant with the results obtained from the discussion of the three years for which full records are available, it seems as though sand moved by storms will have a resultant movement from the eastward toward the westward from Pollock Rip Shoals. This result is rendered still more probable by the fact that westerly winds are offshore, have little fetch, and with the same absolute velocity would cause waves of less height and sand transporting power than easterly winds. There will thus be a continual cause of shoaling in any artificial channel along the lines indicated by the survey.

Digitized by Google

TABLE A.—*Total miles traveled by winds from each direction at Nantucket during the years 1893, 1894, and 1895.*

Months.	North.		Northeast.		East.		Southeast.		South.		Southwest.		West.		Northwest.	
	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.	Miles traveled.	Average velocity.
January	6,040	14	6,406	16	2,102	15	2,293	14	1,180	12	2,211	11	1,421	8	6,779	12
February	8,418	16	5,084	22	576	7	2,608	17	995	13	2,872	12	1,267	9	6,438	14
March	5,966	14	4,760	13	2,345	14	2,511	4	1,792	12	3,279	12	2,134	10	5,938	14
April	2,120	10	6,940	17	2,580	16	4,416	18	1,193	16	5,680	13	2,951	9	2,626	10
May	1,376	9	1,694	10	1,330	13	4,194	15	2,040	12	4,801	11	3,770	9	4,433	9
June	927	8	1,834	13	3,447	15	2,603	12	1,652	8	4,752	10	4,127	9	2,347	13
July	1,905	10	1,953	10	1,011	11	784	9	489	8	4,415	9	5,993	8	2,977	8
August	1,867	9	2,200	12	1,567	10	1,242	9	1,482	10	3,465	9	4,219	8	3,201	7
September	1,417	10	4,259	14	2,566	12	3,081	23	888	8	3,464	10	1,825	4	2,803	8
October	4,176	13	4,617	16	4,676	17	3,028	14	2,640	13	2,924	11	3,246	9	3,025	10
November	5,722	14	3,561	16	2,665	15	3,260	13	1,416	11	3,067	11	2,777	10	4,794	12
December	6,024	14	5,707	15	3,009	20	3,172	17	996	13	3,766	12	1,731	9	5,391	11
Total miles	45,958	.....	49,015	.....	27,874	.....	33,192	.....	16,583	.....	44,696	.....	35,461	.....	50,752	.....
Per cent	15	.....	16	.....	9	.....	11	.....	6	.....	15	.....	12	.....	16	.....
Total hours	3,618	.....	3,306	.....	1,945	.....	2,264	.....	1,498	.....	4,222	.....	4,252	.....	4,897	.....
Per cent	14	.....	13	.....	8	.....	9	.....	6	.....	16	.....	16	.....	18	.....
Average miles per hour	12.8	.....	14.8	.....	14.3	.....	14.6	.....	11.1	.....	10.6	.....	8.3	.....	10.3	.....

Digitized by Google

TABLE B.—*Velocity, in miles, and direction of maximum winds in each month, with date, for years 1887 to 1910.*

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.	Maximum velocity and direction.	Date.
1887	33 NW.	25	40 NW.	12	41 SE.	22	53 NE.	2	22 NE.	13	32 NE.	10	23 SW.	6	36 N.	26	32 NE.	24	40 NW.	21	46 NE.	1	36 NE.	1
1888	50 S.	26	45 SE.	25	54 SE.	12	35 S.	11	36 E.	25	30 NE.	8	37 NE.	1	36 NW.	13	50 SE.	26	33 NW.	24	40 N.	20	51 NE.	11
1889	42 SE.	21	36 NW.	23	54 NE.	16	45 NE.	8	45 NE.	26	28 NE.	19	33 NE.	19	35 S.	5	42 E.	10	46 NE.	13	44 E.	28	49 NW.	27
1890	48 NW.	9	48 NW.	20	48 E.	19	38 N.	5	60 NE.	29	30 E.	22	36 N.	19	34 SW.	27	38 NE.	29	54 NE.	24	36 NE.	18	48 SE.	26
1891	50 N.	25	40 NW.	4	50 SE.	4	52 SE.	3	38 NE.	12	46 N.	28	46 NE.	9	30 E.	31	48 NE.	7	58 NE.	13	54 NE.	7	42 NW.	17
1892	47 NE.	31	49 SE.	11	52 NE.	1-3	44 NE.	15	40 SE.	20	35 E.	10	35 SW.	28	38 E.	26	36 NE.	5	36 NE.	1	48 E.	29	48 NW.	23
1893	48 NE.	6	50 SE.	22	48 SE.	10	54 SE.	21	38 SE.	4	35 SE.	16	26 NE.	23	52 NE.	21	36 NE.	30	36 NE.	1	40 NE.	9	52 NE.	5
1894	58 SE.	29	58 SE.	13	34 NW.	14	60 SE.	11	38 SE.	31	28 N.	24	26 SE.	24	27 NE.	21	42 SE.	30	54 SE.	10	60 NE.	6	48 SE.	27
1895	46 SW.	26	46 S.	7	36 N.	18	50 SW.	9	34 SE.	1	34 E.	8	30 S.	4	20 NE.	21	25 SW.	29	42 S.	13	42 E.	2	51 E.	11
1896	48 SE.	24	48 SW.	6	42 SE.	11	40 N.	22	37 NE.	6	35 E.	14	28 N.	31	33 N.	5	55 S.	10	60 NE.	12	42 N.	14	62 NE.	16
1897	48 NW	28	47 NE.	3	42 NW	4	31 N.	20	36 SE.	2	37 NE.	10	35 S.	14	30 SE.	24	33 NE.	17	49 NE.	21	39 NW.	12	40 NW.	24
1898	71 S[illegible]	31	50 SE.	21	46 N.	31	48 NE.	28	40 E.	8	36 NE.	1	34 N.	14	31 NW.	5	36 NE.	24	32 NW.	15	72 NE.	27	54 SE.	5
1899	44 NE.	1	52 NE.	13	53 E.	7	48 NE.	16	44 NE.	3	43 NE.	29	27 SW.	21	28 SE.	11	35 E.	11	37 N.	6	34 N.	20	41 SE.	24
1900	46 SE.	29	59 N.	18	36 S.	1	33 N.	6	31 NE.	26	33 NE.	4	28 NW.	1	26 NE.	2	48 N.	18	38 N.	17	46 W.	9	61 W.	5
1901	56 N.	26	48 NW.	7	46 SE.	11	54 NE.	15	47 E.	19	36 NE.	15	30 W.	2	29 S.	3	47 N.	24	39 NW.	6	68 E.	24	54 NE	4
1902	47 SE.	22	64 E.	17	48 N.	14	48 E.	18	42 NW.	9	37 NE.	29	35 NW.	15	36 NW.	12	36 SE.	13	48 NE.	12	51 E.	26	62 N.	5
1903	49 SE.	3	48 NW.	17	43 NW.	29	48 N.	17	41 NE.	5	48 SE.	12	48 SE.	19	46 E.	5	38 NE.	21	48 NE.	11	43 N.	28	50 S.	20
1904	60 N.	3	47 NW.	1	45 NW	16	42 SE.	1	36 SE.	9	42 N.	22	30 E.	23	35 SE.	20	58 S.	15	48 NE.	12	60 NE.	13	64 N.	18
1905	70 NE.	25	48 NE.	22	48 NE.	22	47 SW.	21	46 SW.	3	46 NE.	6	48 E.	23	39 E.	16	36 S.	4	40 SE.	12	52 SW.	29	64 N.	10
1906	67 NE.	14	60 NE.	28	60 E.	19	49 SE.	10	55 NE.	29	42 SW.	9	42 SW.	4	38 NE.	24	43 NE.	15	60 NE.	31	59 E.	15	44 W.	1
1907	50 SW.	4	70 NE.	5	56 NE.	24	47 NE.	9	43 SE.	4	53 NE.	3	35 SW.	12	35 N.	4	48 NW.	29	60 SW.	8	68 E.	6	55 E.	14
1908	83 NE.	24	58 SE.	1	56 SW.	15	49 SW.	15	51 W.	3	32 SW.	9	39 SW.	18	55 NE.	27	48 N.	17	56 N.	30	42 W.	6	60 NE.	23
1909	48 SW.	6	53 SW.	20	55 NE.	4	46 SW.	19	57 NE.	22	48 NE.	6	47 N.	8	47 E.	17	37 NE.	26	46 NE.	15	67 NE.	24	61 E.	26
1910	66 NE.	14	53 SW.	12	47 SW.	14	42 S.	30	36 SW.	7	55 NE.	10	41 S.	25	36 SW.	26	43 NE.	17	54 SW.	27	54 NE.	4	48 NE.	7
1911	48 NW.	28	52 E.	7	54 W.	16	70 NE.	20	42 SW.	3	41 N.	8	65 NE.	28	36 SW.	18	.....	...	.....	...	.....	...	.....	...

Digitized by Google

TABLE C.—*Velocities (in miles) and directions of maximum winds exceeding 21 miles an hour in each month for years 1887 to 1910, inclusive.*

Year.	North.	North-east.	East.	Southeast.	South.	Southwest.	West.	Northwest.
1887	36 Aug.	53 Apr.		41 Mar.		23 July		33 Jan.
		22 May						40 Feb.
		22 June						40 Oct.
		32 Sept.						
		46 Nov.						
		36 Dec.						
1888	40 Nov.	30 June	36 May	45 Feb.	50 Jan.			36 Aug.
		37 July		54 Mar.				33 Oct.
		51 Dec.		50 Sept.				
1889		54 Mar.	42 Sept.	42 Jan.	35 Aug.			36 Feb.
		45 Apr.	44 Nov.					49 Dec.
		45 May						
		28 June						
		33 July						
		46 Oct.						
1890	38 Apr.	60 May	48 Mar.	48 Dec.		34 Aug.		48 Jan.
	36 July	38 Sept.	30 June					48 Feb.
		54 Oct.						
		36 Nov.						
1891	50 Jan.	38 May	30 Aug.	50 Mar.				42 Dec.
	48 June	46 July		52 Apr.				40 Feb.
		48 Sept.						
		58 Oct.						
		54 Nov.						
1892		47 Jan.	35 June	49 Feb.		35 July		48 Dec.
		52 Mar.	38 Aug.	40 May				
		44 Apr.	48 Nov.					
		36 Sept.						
		36 Oct.						
1893		48 Jan.		50 Feb.				
		26 July		48 Mar.				
		52 Aug.		54 Apr.				
		36 Sept.		38 May				
		36 Oct.		35 June				
		40 Nov.						
		52 Dec.						
1894	28 June	27 Aug.		58 Jan.				34 Mar.
		60 Nov.		58 Feb.				
				60 Apr.				
				38 May				
				26 July				
				42 Sept.				
				54 Oct.				
				48 Dec.				
1895	36 Mar.	20 Aug.	34 June	34 May	46 Feb.	46 Jan.		
			42 Nov.		30 July	50 Apr.		
			51 Dec.		42 Oct.	25 Sept.		
1896	40 Apr.	37 May	35 June	48 Jan.	55 Sept.	48 Feb.		
	28 July	60 Oct.		42 Mar.				
	33 Aug.	62 Dec.						
	42 Nov.							
1897	31 Apr.	47 Feb.		36 May	35 July			48 Jan.
		37 June		30 Aug.				42 Mar.
		33 Sept.						39 Nov.
		49 Oct.						40 Dec.
1898	46 Mar.	48 Apr.	40 May	71 Jan.				31 Aug.
	34 July	36 June		50 Feb.				32 Oct.
		36 Sept.		54 Dec.				
		72 Nov.						
1899	37 Oct.	44 Jan.	53 Mar.	28 Aug.				
	34 Nov.	52 Feb.	35 Sept.	41 Dec.		27 July		
		48 Apr.						
		44 May						
		43 June						
1900	59 Feb.	31 May.		46 Jan.	36 Mar.		46 Nov.	28 July.
	33 Apr.	33 June.					61 Dec.	
	18 Sept.	26 Aug.						
	38 Oct.							
1901	56 Jan.	54 Apr.	47 May.	46 Mar.	29 Aug.		30 July.	48 Feb.
	47 Sept.	36 June.	68 Nov.					39 Oct.
		54 Dec.						
1902	48 Mar.	41 June.	64 Feb.	47 Jan.				42 May.
		48 Oct.	48 Apr.	36 Sept.				35 July.
	62 Dec.		51 Nov.					36 Aug.
1903	48 Apr.	41 May.	46 Aug.	49 Jan.				48 Feb.
	43 Nov.	38 Sept.		48 June.				43 Mar.
		48 Oct.		48 July.				
1904	60 Jan.	48 Oct.	30 July.	42 Apr.	58 Sept.			47 Feb.
	42 June.	60 Nov.		36 May.				45 Mar.
	64 Dec.			35 Aug.				

Digitized by Google

TABLE C.—*Velocities (in miles) and directions of maximum winds exceeding 21 miles an hour in each month for years 1887 to 1910, inclusive*—Continued.

Year.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
1905	64 Dec.	70 Jan. 48 Feb. 48 Mar. 46 June. 39 Aug.	48 July.	40 Oct.	36 Sept.	47 Apr. 46 May. 52 Nov.		
1906		67 Jan. 60 Feb. 55 May. 38 Aug. 43 Sept. 60 Oct.	60 Mar. 59 Nov.	49 Apr.		42 Jan. 42 July.	44 Dec.	
1907	35 Aug.	70 Feb. 56 Mar. 47 Apr. 53 June.	55 Dec. 68 Nov.	43 May.		50 Jan. 35 July. 60 Oct.		48 Sept.
1908	48 Sept. 56 Oct.	83 Jan. 55 Aug. 60 Dec.		58 Feb.		56 Mar. 46 Apr. 32 June. 39 July.	51 May. 42 Nov.	
1909	47 July.	55 Mar. 57 May. 48 June. 37 Sept. 46 Oct. 67 Nov.	47 Aug. 61 Dec.			48 Jan. 53 Feb. 46 Apr.		
1910		66 Jan. 55 June. 43 Sept. 54 Nov. 48 Dec.			42 Apr. 41 July.	53 Feb. 47 Mar. 36 May. 36 Aug. 54 Oct.		
Total	1,533	4,510	1,393	2,137	620	1,211	274	1,2[illegible]
Per cent	12	35	11	17	5	9	2	[illegible]
No. of times	35	97	30	47	15	28	6	[illegible]
Mean	43.6	46.4	46.4	45.4	41.3	43.2	45.7	[illegible]

TABLE D.—*Velocities (in miles) and directions of maximum winds exceeding 34 miles an hour in each month for years 1887 to 1910.*

Year.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
1887		53 Apr. 46 Nov. 36 Dec.		41 Mar.				[illegible]
1888	40 Nov.	37 July. 51 Dec.	36 May.	45 Feb. 54 Mar. 50 Sept.	50 Jan. 35 Apr. 35 Aug.			35 [illegible]
1889		54 Mar. 45 Apr. 45 May. 46 Oct.	42 Sept. 44 Nov.	42 Jan.	35 Aug.			[illegible]
1890	38 Apr. 36 July.	60 May. 38 Sept. 54 Oct. 36 Nov.	48 Mar.	48 Dec.				[illegible]
1891	50 Jan. 46 June.	38 May. 46 July. 48 Sept. 58 Oct. 54 Nov.		50 Mar. 52 Apr.				[illegible]
1892		47 Jan. 52 Mar. 36 Sept. 36 Oct.	35 June. 38 Aug. 48 Nov.	49 Feb. 40 May.		35 July.		[illegible]
1893		48 Jan. 52 Aug. 36 Sept. 36 Oct. 40 Nov. 52 Dec.		50 Feb. 48 Mar. 54 Apr. 38 May. 35 June.				
1894		60 Nov.		58 Jan. 58 Feb. 60 Apr. 38 May. 42 Sept. 54 Oct. 48 Dec.				

Digitized by Google

TABLE D.—*Velocities (in miles) and directions of maximum winds exceeding 34 miles per hour in each month for years 1887 to 1910*—Continued.

Year.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
895	36 Mar.		42 Nov. 51 Dec.		46 Feb. 42 Oct.	46 Jan. 50 Apr.		
896	40 Apr. 42 Nov.	37 May. 60 Oct. 62 Dec.	35 June.	48 Jan. 42 Mar.	55 Sept.	48 Feb.		
897		47 Feb. 37 June. 49 Oct.		36 May.	35 July.			48 Jan. 42 Mar. 39 Nov. 40 Dec.
898	46 Mar.	48 Apr. 36 June. 36 Sept. 72 Nov.	40 May.	71 Jan. 50 Feb. 54 Dec.				
899	37 Oct.	44 Jan. 32 Feb. 48 Apr. 44 May. 43 June.	53 Mar.	41 Dec.				
900	59 Feb. 48 Sept. 38 Oct.			46 Jan.	36 Mar.		46 Nov. 61 Dec.	
901	56 Jan. 47 Sept.	54 Apr. 36 June. 54 Dec.	47 May. 68 Nov.	46 Mar.				48 Feb. 39 Oct.
902	48 Mar. 62 Dec.	37 June. 48 Oct.	64 Feb. 48 Apr. 51 Nov.	47 Jan. 36 Sept.				42 May. 35 July. 36 Aug.
903	48 Apr. 43 Nov.	41 May. 38 Sept. 48 Oct.	46 Aug.	49 Jan. 48 June. 48 July.	50 Dec.			45 Feb. 43 Mar.
904	60 Jan. 42 June. 64 Dec.	48 Oct. 60 Nov.		42 Apr. 36 May. 35 Aug.	58 Sept.			47 Feb. 45 Mar.
905	64 Dec.	70 Jan. 48 Feb. 48 Mar. 64 June. 39 Aug.	48 July.	40 Oct.	36 Sept.	47 Apr. 46 May. 52 Nov.		
906		67 Jan. 60 Feb. 55 May. 38 Aug. 43 Sept. 60 Oct.	60 Mar. 59 Nov.	49 Apr.		47 June. 42 July.	44 Dec.	
907	35 Aug.	70 Feb. 56 Mar. 47 Apr. 43 June.	68 Nov. 55 Dec.	43 May.		50 Jan. 35 July. 60 Oct.		48 Sept.
908	48 Sept. 36 Oct.	83 Jan. 55 Aug. 60 Dec.		58 Feb.		56 Mar. 49 Apr. 36 July.	51 May. 42 Nov.	
909	47 July.	55 Mar. 57 May. 48 June. 37 Sept. 48 Oct. 67 Nov.	47 Aug. 61 Dec.			48 Jan. 53 Feb. 48 Apr.		
910		66 Jan. 55 June. 43 Sept. 54 Nov. 48 Dec.			42 Apr. 41 July.	53 Feb. 47 Mar. 36 May. 36 Aug. 54 Oct.		
Total	1,276	4,155	1,269	2,019	596	1,070	244	1,027
No. of times	27	84	26	43	14	23	5	24
Mean velocity	47.3	49.5	48.8	46.9	42.6	46.5	48.8	42.8

Total number of times wind velocity exceeded 34 miles per hour equals 246 in the 24 years from 1887 to 1910; equals about 10 times per year. Of these, 180 were from the eastern semicircle north and 66 were from the western semicircle.

This would indicate that 7.5 times per year winds were blowing south that would be likely to produce serious sand movement from the eastward.

Digitized by Google

TABLE E.—*Velocities (in miles) and directions of maximum winds at Nantucket ing 44 miles per hour in each month for the years 1887 to 1910, inclusive*

Year.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.
1887		53 Apr. 46 Nov.					
1888		51 Dec.		45 Feb. 54 Mar. 50 Sept.	50 Jan.		
1889		54 Mar. 45 Apr. 45 May 46 Oct.					
1890		60 May 54 Oct.	48 Mar.	48 Dec.			
1891	50 Jan. 46 June	46 July 48 Sept. 58 Oct. 54 Nov.		50 Mar. 52 Apr.			
1892		47 Jan. 52 Mar.	48 Nov.	49 Feb.			
1893		48 Jan. 52 Aug. 52 Dec.		50 Feb. 48 Mar. 54 Apr.			
1894		60 Nov.		58 Jan. 58 Feb. 60 Apr. 54 Oct. 48 Dec.			
1895			51 Dec.		46 Feb.	46 Jan. 50 Apr.	
1896		60 Oct. 62 Dec.		48 Jan.	55 Sept.	48 Feb.	
1897		47 Feb. 49 Oct.					
1898	46 Mar.	48 Apr. 72 Nov.		71 Jan. 50 Feb. 54 Dec.			
1899		52 Feb. 48 Apr.	53 Mar.				
1900	59 Feb. 48 Sept.			46 Jan.			46 Nov 61 Dec
1901	56 Jan. 47 Sept.	54 Apr. 54 Dec.	47 May 68 Nov.	46 Mar.			
1902	48 Mar. 62 Dec.	48 Oct.	64 Feb. 51 Nov. 48 Apr.	47 Jan.			
1903	48 Apr.	48 Oct.	46 Aug.	49 Jan. 48 June 48 July	50 Dec.		
1904	60 Jan. 64 Dec.	48 Oct. 60 Nov.			58 Sept.		
1905	64 Dec.	70 Jan. 48 Feb. 48 Mar. 46 June	48 July			47 Apr. 46 May 52 Nov.	
1906		67 Jan. 60 Feb. 55 May 60 Oct.	60 Mar. 59 Nov.	49 Apr.			
1907		70 Feb. 56 Mar. 47 Apr. 53 June	68 Nov. 55 Dec.			50 Jan. 60 Oct.	
1908	48 Sept. 56 Oct.	83 Jan. 55 Aug. 60 Dec.		58 Feb.		56 Mar. 49 Apr.	51 May
1909	47 July	55 Mar. 57 May 48 June 46 Oct. 67 Nov.	47 Aug. 61 Dec.			48 Jan. 53 Feb. 46 Apr.	
1910		66 Jan. 55 June 54 Nov. 48 Dec.				53 Feb. 47 Mar. 54 Oct.	
Total	849	3,095	932	1,392	259	805	162
Per cent	11	39	12	17	3	10	2
No. of times	16	57	17	27	5	16	3
Mean	53.1	54.3	54.2	51.8	51.9	50.3	54.0

Digitized by Google

TABLE F.—*Velocities (in miles; and directions of maximum winds exceeding 54 miles per hour in each month for years 1890 to 1910, inclusive.*

Year.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
1890		60 May						
1891		58 Oct.						
1894		60 Nov.		58 Jan. 58 Feb. 60 Apr.				
1896		60 Oct. 62 Dec.			55 Sept.			
1898		72 Nov.		71 Jan.				
1900	59 Feb.						61 Dec.	
1901	56 Jan.		68 Nov.					
1902	62 Dec.		64 Feb.					
1904	60 Jan. 64 Dec.	60 Nov.			58 Sept.			
1905	64 Dec.	70 Jan. 64 June						
1906		67 Jan. 60 Feb. 55 May 60 Oct.	60 Mar. 59 Nov.					
1907		70 Feb. 56 May	68 Nov. 55 Dec.			60 Oct.		
1908	56 Oct.	83 Jan. 55 Aug. 60 Dec.		58 Feb.		56 Mar.		
1909		55 Mar. 57 May 67 Nov.	61 Dec.					
1910		66 Jan. 55 June						
Total	421	1,432	435	305	113	116	61	
Number of times	7	23	7	5	2	2	1	
Mean velocity	60.1	62.2	62.1	61.0	56.5	58.0	61.0	

APPENDIX III.

EFFECTS OF THE DIRECTIONS OF TIDAL CURRENTS IN THE VICINITY OF POLLOCK RIP.

To oppose the probably prevalent movement from the eastward of wave-carried sand the only natural force appears to be the tidal flow. The action of this force differs from the wind and wave effects essentially in that it is extremely regular, occurring every day with perfect certainty, and following a law which is entirely systematic.

Plate I shows a great excess of velocity of tidal currents along the general direction of the channel proposed, whether the tide is rising or falling. The direction of this natural flow is in general terms across that of the probable movement of sand by waves. The currents moving from the northeast to the southwest are nearly equal in strength to those flowing in the opposite direction, and there is a peculiarity in the tidal flow at this place which has a bearing on the question, namely, that there is practically no stage of the tide at which there is slack water. The direction of the flow changes with the elevation of the tide continuously following the direction of the hands of a watch, the maximum flow being, as stated, practically parallel to the lines selected for the channel. Another tidal feature bearing on this question is the relative fall and rise of the tide in Nantucket Sound as compared with the tides at Race Point and outside of Pollock Rip. In Nantucket Sound the range is only about 3 feet, while at Race Point the range is 9 feet. At the lightship eastward of Pollock Rip Shoals the range is 4 feet, while to the westward in Nantucket Sound the range is only 3 feet. This variation of tidal ranges is perhaps the cause of the absence of any prolonged period of slack water. A very powerful scouring force appears to be in operation to the southward and eastward of the Handkerchief Shoal, turning up thence nearly parallel with the coast of Cape Cod and losing scouring power as it reaches the middle part of the area covered by the survey of 1910. From this comparatively deep area, at the time of the earlier surveys, quite a deep channel led entirely across Pollock Rip Shoals toward the east. With the lapse of time this channel closed up as a navigable route, and commerce was deflected to the north somewhat along the lines of the present sailing course. There has been a tendency indicated, but not with entire continuity, since the survey of 1863, to break through toward the northeast

Digitized by Google

somewhere in the direction of the proposed channel, but while the deeper water has worked up toward the northeast, it has uninterruptedly carried in front of it a comparatively shallow crest so that commerce can not utilize the deep water as yet. The eroding tendency has been in continuous existence so long that it is probable assistance in maintaining the straight upper part of the channel may be looked for from this cause but the maintenance of the continuous bar across the extreme northern end of the that such a channel would have to be entirely artificial at that part, if undertaken. It is only at the extreme north end of the channel, and in another section toward the south end, that the inability of the tidal flow to maintain a depth of water exceeding 30 feet is shown by the maps. There is an irregular but frequently recurring tendency shown by the surveys, for the shoals from the broken part of Pollock Rip to take across the direction of the maximum tidal flow, forming comparatively narrow ridges nearly at right angles to that flow, and the fact that these form and disappear and re-form is an indication that dredging will have to be provided for to an extent sufficient to promptly remove any such shoals, which will undoubtedly form. The direction of these shoals points very suggestively to their creation by wave action due to the prevailing easterly winds.

APPENDIX IV.

Analysis of Surveys Showing Cut and Fill in Different Parts of the Axis of the Proposed Channel at Various Periods Since 1853.

Comparison of the surveys which it has been possible to make may greatly understate the quantities of sand which may have to be handled artificially if the channel is to be maintained at all times at a navigable depth. The surveys were made at intervals of several years and it is probable that the large amount of sand that has been driven into the channel by particularly heavy storms has been to a considerable extent again washed out by the tidal scour before the next survey was made. It is not improbable that these shoals have formed and re-formed, and been removed and removed again between the periods of the two successive surveys which we have been able to compare. With a view to determining what capacity of dredging plant is needed to create and maintain the proposed channel, it seems wise to disregard any aid from the cutting shown in any areas under comparison and to look only to the absolute amount of sand movement into the channel which has taken place in the known periods in these areas. The results of the comparison of surveys are shown in Tables G, H, J, K, and L, M, N, O, P, Q, R, and on Plate 13. To compare the different surveys which have been made in this vicinity, the area in question was divided up into squares one-third of a mile on a side, and the average depth at the epoch of each survey was obtained for each of these squares. This is shown on the tracing. A comparison of the means of the depths existing in each square at the various epochs shows the average cut or fill for that square between the periods of the successive surveys, and on plate the cubic yards corresponding to the average cut or fill of the depth over that area is shown in each square. Cut is shown in red, fill in black, and a glance at the map shows that there are great areas in which fill has predominated and others in which cutting has been in progress almost continuously for the whole period since 1853. The rest of the map shows an extraordinary variation between cut and fill, in some cases very large in amount, indicating that the bulk of the material through which this channel runs is easily moved by the forces in action. In the preliminary report of Lieut. Col. Sanford it is stated that a depth of 25 feet was requested by those interested in the channel, as being sufficient to the needs of commerce but the meaning of the words "25 feet depth" in a location so much exposed to rough weather seems to require the creation of a depth much more than 25 feet in order to admit 25-foot navigation, especially as the total rise and fall of the tides is only about 4 feet. At the hearing on October 18, 1911, a depth of 30 feet was asked by the navigators present. The number of yards required to be removed to give an open through depth of 30 feet is shown on the plate, and it is believed that a 30-foot depth is what should be provided and maintained in order to permit actual and practical 25-foot navigation. Twenty-five feet is the depth which will be provided by the Cape Cod Canal when finished, and the two routes are practically parallel and competing lines of travel. If it is worth while to create a new channel at Pollock Rip, it should be at least of as great effective depth as the interior line through Buzzards Bay and Massachusetts Bay, and 30 feet in the Pollock Rip Channel is no more than the equivalent of 25 feet in the still water of the other line.

Digitized by Google

TABLE G.—*Cut and fill, in feet, in that part of Bearse and Pollock Rip Shoals to be dredged to maintain a 30-foot channel as shown by survey of 1910.*

Areas compared.		Surveys.				Total surveys, 1853–1910.	
		1853–1872		1872–1910			
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill.
		Ft.	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*
Zone 1	Squares B to A, inclusive	5.6	.....	.....	7.7	.....	2.1
Zone 2	Squares B to A, inclusive	5.3	.....	4.4	5.6	4.9	0.8
	Squares G to F, inclusive	.....	34.9	.....	14.4	.....	49.3
Zone 3	Squares G to B, inclusive	2.4	18.7	1.9	24.8	4.2	43.4

TABLE H.—*Cut and fill, in cubic yards, in that part of Pollock Rip and Bearse Shoals to be dredged to maintain a 30-foot channel as shown by survey of 1910.*

Areas compared.		Surveys.					
		1853–1872 [1]		1872–1910 [2]		1853–1910 [3]	
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill.
		Cu. yds.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Zone 1	Squares B to A, inclusive	642,465	.....	.....	883,390	.....	240,924
Zone 2	Squares B to A, inclusive	608,048	.....	504,794	642,465	562,157	91,781
	Squares G to F, inclusive	.....	4,003,937	.....	1,652,054	.....	5,655,992
Zone 3	Squares G to B, inclusive	275,342	2,145,376	217,979	2,845,204	481,849	4,979,108
Total		1,525,855	6,149,313	722,773	6,022,113	1,044,006	10,967,805
Per year		80,308	323,648	19,020	158,503	18,316	192,417

[1] Interval, 19 years. [2] Interval, 38 years. [3] Interval, 57 years.

TABLE I.—*Cut and fill in feet of depth in that part of Stone Horse Shoal which shows soundings of less than 30 feet in survey of 1910.*

Area compared.		Surveys.					
		1853–1872.		1872–1899 (fill).	1872–1910 (fill).	1853–1910.	
		Cut.	Fill.			Cut.	Fill.
Zone 1	Squares N to M, inclusive	4.9	2.4	9.6	19.9	.....	17.4
Zone 2	Squares O to N, inclusive	7.1	.....	13.1	11.9	0.3	5.0
Zone 3	Squares P to O, inclusive	.....	11.4	.....	2.7	.....	14.2

Digitized by Google

TABLE J.—*Cut and fill in cubic yards in that part of Stone Horse Shoal to be dredged to maintain a 30-foot channel, in survey of 1910.*

Area considered.		Surveys.					
		1853–1872.[1]		1872–1909 (fill).	1872–1910 (fill).[2]	1853–1910.[3]	
		Cut.	Fill.			Cut.	Fill.
Zone 1....	Squares N to M, inclusive.....	562,177	275,328	1,101,312	2,282,928	.....	1,996,12[illegible]
Zone 2....	Squares O to N, inclusive.....	814,512	.....	1,502,832	1,365,239	344,178	573,6[illegible]
Zone 3....	Squares P to O, inclusive.....	.....	1,307,808	.....	309,760	.....	1,629,1[illegible]
Total.....		1,376,689	1,583,136	2,604,144	3,957,927	344,178	4,198,8[illegible]
Per year.....		72,457	83,323	.....	104,156	60,371	73,664

[1] Interval, 19 years. [2] Interval, 38 years. [3] Interval, 57 years.

TABLE K.—*Cut and fill in feet of depth in that part of Bearse and Pollock Rip Shoals to be dredged to maintain a 30-foot channel as shown in the survey of 1910.*

Areas compared.		Surveys.					
		1872–1883		1883–1891		1891–1910	
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill
Zone 1...	Squares B to A inclusive.....	0.2	3.2	5.8	3.1	0.2	[illegible]
Zone 2...	Squares B to A inclusive.....	.....	2.4	6.2	.....	2.4	[illegible]
	Squares G to F inclusive.....	.7	10.0	4.0	7.2	.....	[illegible]
Zone 3...	Squares G to B inclusive.....	.....	24.3	8.4	5.2	11.6	11.[illegible]

TABLE L.—*Cubic yards of above.*

Areas compared.		Surveys.					
		1872–1883[1]		1883–1891[2]		1891–1910[3]	
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill.
Zone 1.....	Squares B to A, inclusive..	22,945	367,123	665,411	355,651	22,945	[illegible] 356
Zone 2.....	Squares B to A, inclusive..	.....	275,342	711,312	.....	.....	.....
	Squares G to F, inclusive..	80,308	1,142,760	458,940	826,027	275,342	848,9[illegible]
Zone 3.....	Squares G to B, inclusive..	.....	2,787,841	963,698	596,575	1,330,822	1,261,[illegible]
Total ..	.....	103,253	4,573,066	2,799,361	1,778,253	1,629,109	2,799,3[illegible]
Per year.....	.....	9,387	415,733	349,920	222,282	85,744	147,3[illegible]

[1] Interval, 11 years. [2] Interval, 8 years. [3] Interval, 19 years.

TABLE M.—*Cut and fill, in feet, of depth in that part of Stone Horse Shoal to be dredged to maintain a 30-foot channel as shown in the survey of 1910.*

Areas compared.		Surveys.					
		1872–1883		1883–1891		1891–1910	
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill
Zone 1...	Squares N to M, inclusive.....	.....	9.8	.....	3.1	.....	7.0
Zone 2...	Squares O to N, inclusive.....	.....	0.7	0.6	3.4	.....	2.8
Zone 3...	Squares P to O, inclusive.....	.....	5.7	.4	1.3	3.9	.....

Digitized by Google

TABLE N.—*Cubic yards of above.*

Areas compared.		Surveys.					
		1872-1883.[1]		1883-1891.[2]		1891-1910.[3]	
		Cut.	Fill.	Cut.	Fill.	Cut.	Fill.
Zone 1	Squares N to M, inclusive	.....	1,124,314.8	0.0	355,650.6	.....	808,082
Zone 2	Squares O to N, inclusive	.....	768,664.2	68,835.6	390,068.4	.....	321,233
Zone 3	Squares P to O, inclusive	.....	653,938.2	45,890.4	149,143.8	447,431	.....
Total		.....	2,546,917.2	114,726.0	894,862.8	447,431	1,124,315
Per year		.....	231,538	14,340	111,858	23,550	59,175

[1] Interval, 11 years. [2] Interval, 8 years. [3] Interval, 19 years.

TABLE O.—*Summary of Tables H, J, L, and N, Bearse and Pollock Rip Shoals, over the squares which would be affected by the 1910 survey.*

Dates of surveys.	Cut.	Fill.	Period.	Rate per year.	
				Cut.	Fill.
	Cu. yds.	*Cu. yds.*	*Years.*	*Cu. yds.*	*Cu. yds.*
1853-1872	1,525,855	6,149,313	19	80,308	323,648
1872-1883	103,253	4,573,066	11	9,387	415,733
1883-1891	2,799,361	1,778,253	8	349,920	222,282
1891-1910	1,629,109	2,799,314	19	85,744	147,332
Total	6,057,578	15,299,946	.....	.....	.....

TABLE P.—*Stone Horse Shoal.*

Dates of surveys.	Cut.	Fill.	Period.	Rate per year.	
				Cut.	Fill.
	Cu. yds.	*Cu. yds.*	*Years.*	*Cu. yds.*	*Cu. yds.*
1853-1872	1,376,689	1,583,136	19	72,457	83,323
1872-1883	.....	2,546,917	11	.....	231,538
1883-1891	114,726	894,863	8	14,340	111,858
1891-1910	447,431	1,124,315	19	23,550	59,175
Total	1,938,846	6,149,231	.....	.....	.....

TABLE Q.—*Summary of Tables O and P, including Stone Horse Shoal and Bearse and Pollock Rip Shoals.*

Dates of surveys.	Cut.	Fill.	Period.	Rate per year.	
				Cut.	Fill.
	Cu. yds.	*Cu. yds.*	*Years.*	*Cu. yds.*	*Cu. yds.*
1853-1872	2,902,544	7,732,449	19	152,765	406,971
1872-1883	103,253	7,119,983	11	9,387	647,271
1883-1891	2,914,087	2,573,016	8	364,260	434,140
1891-1910	2,076,540	3,923,629	19	109,294	206,507
Total	7,996,424	21,349,077	57	140,268	374,550

Digitized by Google

TABLE J.—*Cut*

ences of the mean depths at data
ate square.

F AND INCLUDED WITHIN THE
HANNEL.

	Area consi		...ule zone.		East zone.		Total.	
			...t.	Fill.	Cut.	Fill.	Cut.	Fill.
Zone 1....	Squ... in		...9	43.0	27.6	34.0	99.8	83.1
Zone 2....	Squ... in		.....	25.1	1.4	12.7 / 2.6 / 0.0	6.7	7.6
Zone 3....	Squ... in		.....	5.9	7.3		8.8	7.4
			.4	.5	1.2	2.3	5.3	4.3
			6.5	.8	2.6	7.9	21.0	11.9
Total....			36.2	40.6	13.9	25.2	98.8	121.9
Per year.....			63.1	83.6	41.5	59.2	198.6	20...

ES TO THE PROPOSED CHANNEL AND
L PORTIONS OF THE MONOMOY SHOALS.

					Cut.	Fill.
				1899–1902—Continued.		
				Squares C3 to C7, inclusive.....	4.7	2.1
				Squares D5 to D7, inclusive.....	.....	2.5
				Squares E5 to E7, inclusive.....	2.4	....
				Squares F5 to F6, inclusive.....	4.0	.....
				Square G5.....	1.0	.....
				Square H4.....	2.0	.....
				Squares I2 to I3, inclusive.....	4.8	.....
				Squares J to J2, inclusive.....	8.9	.....
				Squares K to K1, inclusive.....	3.3	1.3
				Total.....	56.0	11.6
				1902–1909.		
				Squares b3 to b6, inclusive.....	11.3	0.7
				Squares a3 to a5, inclusive.....	.5	2.1
				Squares A4 to A5, inclusive.....	.....	1.7
				Squares C6 to C7, inclusive.....	.5	4.1
				Squares D6 to D7, inclusive.....	.....	5.9
				Squares E6 to E7, inclusive.....	.....	2.1
				Squares F4 to F7, inclusive.....	.2	2.1
				Squares G4 to G6, inclusive.....	.8	.5
				Squares H3 to H5, inclusive.....	.....	1.9
				Squares I to I4, inclusive.....	1.8	3.2
				Squares J to J2, inclusive.....	8.7	2.8
				Squares K to K1, inclusive.....	4.5	4.6
				Square L.....	.....	.2
				Total.....	23.3	32.5
				1909–1910.		
				Squares b3 to b4, inclusive.....	4.7	.....
				Squares a3 to a5 inclusive.....	3.4	1.1
				Squares A4 to A5, inclusive.....	4.7	.....
				Squares C6 to C7, inclusive.....	36.0	.....
				Squares D6 to D7, inclusive.....	5.3	.....
				Square E7.....	.8	....
				Square F2.....	.....	5.6
				Squares G to G2, inclusive.....	8.7	1.9
				Squares H to H2, inclusive.....	3.3	.8
				Squares I to I2, inclusive.....	1.4	.5
				Squares J to J2, inclusive.....	6.0	1.4
				Squares K to K1, inclusive.....	1.6	.9
				Total.....	43.5	12.1

TABLE K.–
be d

Zone 1...	S...			3.5
Zone 2...	S...			.8
Zone 3...	S...			7.0
				13.5
				21.4
				7.1
				.1
				1.0
				1.4
				4.6
Zone 1.....				20.6
Zone 2.....				11.6
Zone 3.....				13.8
Total ..				9.7
				12.9
				10.1
Per year.....				141.8

TABLE M.–

Zone 1...	S...			10.9
Zone 2...	S...			5.7
Zone 3...	S...			141.7

APPENDIX V.

...IN THE LIMITS OF THE CHANNEL AS SHOWN BY SURVEY
...OVAL IS PROBABLY NECESSARY TO GIVE A CLEAR CHAN-
... FEET DEPTH, RESPECTIVELY, AT MEAN LOW WATER.

Zone 1...	S...			...ican Association of Masters and Pilots for a	Cubic yards. 3,803,101
Zone 2...	S...			...w broken line, to avoid heavy cutting on	
Zone 3...	S...			...th of 25 feet.....	3,333,101
				...feet.....	11,751,833

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 540.

ALLEGHENY RIVER, PA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF ALLEGHENY RIVER, PA., WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT, WITH A VIEW TO THE CONSTRUCTION OF ADDITIONAL LOCKS AND DAMS.

FEBRUARY 14, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 13, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 12th instant, together with copies of reports from Lieut. Col. H. C. Newcomer, Corps of Engineers, dated November 11, 1911, and January 19, 1912, on preliminary examination, with plan and estimate of cost of improvement, of Allegheny River, Pa., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 12, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated November 11, 1911, and January 19, 1912, by Lieut. Col. H. C. Newcomer, Corps of Engineers, on preliminary examination, with plan and estimate of cost of improvement, of Allegheny River, Pa., with a view to the construction of additional locks and dams, called for by the river and harbor act approved February 27, 1911.

Digitized by Google

Allegheny River has been improved by the United States under two projects: One, an open-channel project involving the removal of bowlders, snags, and similar obstructions and the use of regularization dams and dikes; the other, a slack-water project involving the construction of locks and dams. The three locks and dams completed under the latter project, after some dredging is done, will afford a navigable depth of 7 feet up to Natrona, 24 miles above the mouth of the river.

The district officer presents a plan for extending slackwater navigation nearly 36 miles farther, to a point about 5 miles above Mahoning, by the construction of five additional locks and dams, at points designated in his report, at a total estimated cost of $2,788,000. The cost of maintenance and operation will depend upon the amount of commerce and is estimated to vary from a minimum of about $25,000 a year to as much as $60,000 a year for a traffic of 4,000,000 or 5,000,000 tons. In the opinion of the district officer, who is also the division engineer, it is advisable for the United States to undertake this further improvement, work to be prosecuted at such a rate as to complete all the locks and dams in five years, the initial cash appropriation to be $300,000, with a contract authorization of $800,000.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 29, 1912, concurring in the recommendation of the district officer.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, who is also division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Allegheny River, Pa., by the construction of 5 additional locks and dams at the localities recommended by the district officer, and following in general the methods described in his report, is deemed advisable at an estimated cost of $2,788,000 for first construction, and $25,000 to $60,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under an initial appropriation of $300,000, with a contract authorization of $800,000 and subsequent appropriations in amounts sufficient to complete the entire improvement within 5 years.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF ALLEGHENY RIVER, PA.

United States Engineer Office,
Pittsburgh, Pa., November 11, 1911.

Sir: In compliance with department instructions of April 7, 1911, I have the honor to submit the following report of preliminary examination of the Allegheny River, Pa., with a view to the construction of additional locks and dams, as provided for in the river and harbor act approved February 27, 1911.

Digitized by Google

The following brief table of distances is inserted here for convenience of reference:

Locality.	Distance from mouth.	Locality.	Distance from mouth.
	Miles.		*Miles.*
Herr Island Dam	2	Monterey	80
Dam No. 2 (Aspinwall)	7	Parker	85
Dam No. 3 (Springdale)	17	Clarion River	86
Tarentum	22	Emlenton	92
Natrona	24	Franklin (French Creek)	127
Freeport	29	Oil City	134
Kiskiminetas River	30	Warren	191
Kittanning	45	New York State line	214
Mahoning Creek	56	Olean	256
East Brady	70		

The river is now slack-watered from its mouth to Natrona, and the present inquiry therefore extends from Natrona to the State line. Prior examinations and surveys covering portions of this stretch of the river have been made and reports published, as follows:

Survey from mouth to Franklin (French Creek) in 1828. The maps of this survey are in the Pittsburgh office, but there is no copy of the report of survey and it is not known whether it was ever published.

Examination from mouth to Freeport at mouth of Kiskiminetas River. Annual Report of the Chief of Engineers for 1876, Part II, page 147.

Examination from Freeport to Franklin. Annual Report of the Chief of Engineers for 1879, Part II, page 1731.

Survey from mouth of French Creek (Franklin, Pa.) to Olean, N. Y. Annual Report of the Chief of Engineers for 1880, Part II, page 1767.

Examination from Warren, Pa., to Olean, N. Y. Annual Report of the Chief of Engineers for 1893, Part III, page 2540.

Survey from Tarentum, Pa., to Oil City, Pa., supplemented by examination above Oil City to New York State line. Annual Report of the Chief of Engineers for 1899, Part III, page 2411.

Topographic maps of the United States Geological Survey have been published covering the lower river for about 127 miles from the mouth.

Special attention is invited to the report of survey from Tarentum to Oil City, as it describes the physical conditions in detail, discusses the commercial value of proposed improvement of the river, and gives estimates of cost for extending slack water as far as the State line. The improvement is recommended as far as Monterey, reqiring eight locks and dams in addition to the three already provided in the lower river. Attention is also invited to the accompanying report of Assistant Engineer J. W. Arras for a more extended discussion of some features of the present examination.

The Allegheny River rises in northern Pennsylvania and flows northwestwardly into New York and thence in a southerly direction into Pennsylvania to its point of junction with the Monongahela River at Pittsburgh. The total length of the stream is about 317 miles and its drainage area approximately 11,580 square miles. The average slope from the head of slack water at Natrona to Oil City is about 2.2 feet per mile, and from Oil City to the State line 3.6 feet per mile. The steepest slope below the State line is found below the mouth of the Clarion River, where for the distance of 4.3 miles there is an average slope of 4.76 feet per mile. The low-water discharge

Digitized by Google

at the mouth of the river rarely falls below about 1,400 cubic feet per second, and the highest measured discharge was 236,834 cubic feet per second on March 15, 1907. The records of river stages indicate maximum fluctuations of about 18.5 feet at Warren, 21.8 feet at Oil City, 28.9 feet at Parker, 32.7 feet at Freeport, and 36.6 feet at Herr Island Dam. In its original condition the Allegheny River abounded in obstructions, such as bowlders, snags, bars, and wide-spreading shoals which prevented navigation except during the higher stages that usually obtained for several months each year.

The first appropriation for the river was made in 1879, and since that time the work of improvement has been carried on both by open-channel work and by the construction of locks and dams. The project for open-channel work was adopted in 1878 and 1880, and contemplates the removal of bowlders and snags and the construction of low dams or dikes to close secondary channels and concentrate the low-water flow on the shoals. The amount expended under this project to June 30, 1911, is $266,078.68. Of this amount it is estimated that about $197,000 were applied to improvement and $69,078.68 to maintenance. The work that has been done enables traffic to be carried on safely at stages from 2 to 3 feet lower than formerly. It is of course impracticable with such a small low-water discharge to provide a navigable channel at the low-water stage without locks and dams, but even at this stage navigation is carried on to some extent for short distances in the pools that lie between shoal places.

The project for canalization provides for the construction of three locks and dams which have been built and now give slack water for 24 miles from the mouth of the stream. The project depth is 7 feet, but some dredging remains to be done before this full depth is realized. Dam No. 1 is movable, of Chanoine type with bear-trap weirs; Dams Nos. 2 and 3 are both fixed, the former being built of concrete on pile foundation and the latter of crib construction. The minimum lock dimensions are 55 feet by 286 feet 2 inches. The amount expended on construction of locks and dams to June 30, 1911, was $1,675,912.82. Lock No. 1 has been in operation since January 1, 1903; Lock No. 2 since November 10, 1906; and Lock No. 3 since September, 1904. The amount expended to June 30, 1911, for operation and care of the three locks and dams is $335,064.47. The total expenditures on the river in the interests of navigation to June 30, 1911, amounted to $2,277,055.97.

The following table gives the commercial statistics for the river as derived from the Annual Reports of the Chief of Engineers:

Annual report.	Tonnage.	Annual report.	Tonnage.
1889	949,020	1903	1,848,321
1890	1,043,756	1904	2,282,420
1891	936,009	1905	2,185,547
1892	1,296,821	1906	2,494,445
1893	1,308,300	1907	[1] 1,020,024
1897	2,137,721	1908	[1] 1,345,941
1900	2,570,900	1909	[1] 198,756
1901	1,611,103	1910	1,715,694
1902	2,420,099	1911	2,225,018

[1] Statistics incomplete in the Annual Reports for 1907, 1908, and 1909. The tonnage given in the latter year apparently relates only to the unimproved river above the slack-watered portion. No statistics gathered during years 1893, 1894, 1895, 1897, and 1898.

Digitized by Google

Steamboat navigation on the river is now almost wholly confined to the slack-watered portion, although formerly it extended to Oil City, with occasional trips beyond, even as far as Olean, N. Y. The principal traffic in the open river is the downstream transportation of timber and lumber, rafts, new boat bottoms, barges, and flats usually loaded with tan bark, lumber, posts, railroad ties, and other timber products, and the local movement of gravel and sand at a few places along the river. On the slack-watered portion of the river the principal traffic is in coal, sand, and gravel, the coal coming from the Monongahela River and the sand and gravel being taken from the bed of the Allegheny. There is also some shipment of steel products within the Pittsburgh Harbor, which extends 7 miles up the Allegheny, 15.5 miles up the Monongahela, and 4.7 miles down the Ohio River.

Railroads extend along one or both banks of the river throughout the greater portion of its length. The decline and practical cessation of steamboat traffic that was formerly conducted on the open river is not surprising in view of the railroad competition and the very limited navigation facilities.

Navigation in the Allegheny River is obstructed by a number of low bridges, as will be seen by reference to the table of bridges contained in the accompanying report of Assistant Engineer J. W. Arras. Under existing conditions of navigation the most obstructive bridges are the eight found within a few miles of the mouth from Sixth Street to Forty-third Street, inclusive, at Pittsburgh. Several attempts have been made by the river interests to require suitable alterations in these bridges in the interests of navigation, but so far these efforts have been unsuccessful. The clearance heights of these bridges vary from 27.7 feet to 36 feet above normal pool level, so that only the smaller low-powered steamboats can pass under them. This condition of affairs imposes a handicap upon river traffic which will become still more serious as steamboat navigation is extended farther upstream, requiring boats of greater power to handle tows of adequate size over longer distances.

Inquiries sent out in connection with the present examination have not elicited as many responses as were expected in view of the strong interest that has been shown on prior occasions by the people in the Allegheny Valley. It has been suggested that this apparent lack of interest on the part of shippers may be due to their apprehension that their active participation in securing waterway improvements may subject them to inconvenience or loss in connection with their present railway shipping facilities. Copies of all letters[1] received are transmitted herewith.

The Allegheny Valley is very rich in mineral resources and still provides a considerable volume of timber products. The richest mineral deposits, including coal, iron ore, fire clay, limestone, and glass sand are found between the mouth and Monterey, and there are less extensive deposits as far up as Emlenton. None of these mineral products are at present moved by water. It appears that in 1909 there were 21 coal mines in operation above the Kiskiminetas with an aggregate annual tonnage of about 477,000 and that about 1,350,000 tons of coal originate annually on the two Pennsylvania

[1] Only 5 of the 26 letters received are printed.

Digitized by Google

Railroad lines between Kiskiminetas and Pittsburgh. Within 20 miles above the head of pool No. 3 there are located over 15 manufacturing plants whose annual freight is estimated to be in excess of 1,000,000 tons.

There has been a general impression that the coal from the Allegheny Valley, coming mainly from the Freeport and Kittanning beds, is so inferior to that from the Pittsburgh bed in the Monongahela Valley that it could not compete with the latter in the Pittsburgh market, and this is said to explain the fact that practically all the tonnage mined is shipped north. On the other hand, it is alleged that rail rates are so adjusted that the Allegheny Valley coal can not compete on equal terms with that from the Monongahela Valley in the Pittsburgh district. It is now known, moreover, upon the authority of a large concern operating coal mines in both valleys, that some of the deposits in the Allegheny Valley are of high grade, apparently but little, if any, inferior to the famous Pittsburgh coal. The city of Pittsburgh has recently made a contract for Freeport coal under competitive bids.

The amount of commerce that would make use of the river, if it is slackwatered, can only be conjectured. There are two companies, however, the Pittsburgh Plate Glass Co. and the Allegheny River Mining Co., which indicate that their probable shipments by water would aggregate at least a couple million tons. This alone would probably justify the cost of building the necessary locks and dams.

According to the survey in the Annual Report of 1899, 5 additional locks and dams are required to carry slackwater to Mahoning Creek, 8 to Monterey, 11 to Emlenton, 19 to Oil City, and 54 to the State line. The extension to Mahoning Creek would afford navigation facilities for all the large industrial plants and the rich mineral resources along the lower river. The commerce developed by such an extension would then serve as a basis for estimating the value of some further extension that will probably be needed. It is not considered wise, however, to undertake more than the five additional locks and dams at the present time.

In my opinion the further improvement of the Allegheny River by the construction of five additional locks and dams, extending slackwater from Natrona to a point about 5 miles above Mahoning Creek, is worthy of being undertaken by the United States, and it is recommended that an estimate for this work, based upon previous surveys, be authorized at a cost of $500, chargeable to the appropriation for examinations, surveys, and contingencies of rivers and harbors.

There are practically no terminal facilities at present on the part of the river recommended for improvement, but these can readily be installed by the interested parties when needed. There do not appear to be any other subjects, such as water power, floods, etc., that require consideration in this connection, or that could be so combined with the project for works of navigation as to diminish the cost of the latter to the United States.

Very respectfully, your obedient servant,

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

Digitized by Google

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 11, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The Allegheny River has been improved under two projects, (*a*) open-channel work involving the removal of bowlders, snags, and similar obstructions, and the dams and dykes when necessary, on which project there has been expended to June 30, 1911, $266,078.68, and (*b*) slack-water improvement, under which method three locks and dams have been constructed, affording slack-water navigation from the mouth of the river to Natrona, a distance of 24 miles, at a cost of $1,675,912.82 for construction, and $335,064.47 for operation for several years, the last lock and dam being completed in 1906.

There is a very large commerce on the slack-watered portion of the river, amounting to about 2,000,000 tons annually, while on the open river above it is small, consisting principally of timber and its products, new boat bottoms floated downstream, and some local movement of sand and gravel. The Allegheny Valley is rich in mineral resources, and there are a number of large manufacturing and industrial plants on the banks of the river now handling a large tonnage by rail. It seems reasonable to believe that if the slack water is extended up the valley that a substantial part of the existing commerce will be diverted to the water, and that there will be a partial development, at least, of the mineral resources adjacent to the stream.

The district officer, who is also the division engineer, is of the opinion that the Allegheny River is worthy of further improvement to the extent of constructing five additional locks and dams, which will provide slack-water navigation between Natrona and a point about 5 miles above Mahoning Creek, a distance of 37 miles. In this view the board concurs, provided the cost is not excessive, and therefore recommends the authorization of an estimate of cost which the district officer states can be prepared from data in hand for the sum of $500. It is suggested that the district officer consider and report whether a less number than five additional locks and dams would not adequately serve prospective commercial needs and afford a means of testing the value of a further extension of slack water.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 19, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Allegheny River, Pa., authorized by the river and harbor act of February 27, 1911.

Digitized by Google

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a plan and estimate of cost of improvement of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fourth indorsement.]

WAR DEPARTMENT,
December 20, 1911.

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

REPORT OF ASSISTANT ENGINEER J. W. ARRAS.

UNITED STATES ENGINEER OFFICE,
Pittsburgh, Pa., October 28, 1911

COLONEL: I have the honor to submit the following report of a preliminary examination of the Allegheny River, Pa., with a view to the construction of additional locks and dams in compliance with the provisions of the river and harbor act of February 27, 1911.

Several examinations and surveys of parts of the river have been made heretofore the reports of nearly all of which have been published in the annual reports of the Chief of Engineers. These are as follows:

1828. A survey from mouth to Franklin, 127 miles, by Lieut. Col. Kearney.

Annual Report of the Chief of Engineers for 1876, part 2, page 147. A survey from mouth to Freeport, at mouth of Kiskiminetas River, 30 miles.

Annual Report of the Chief of Engineers for 1879, part 2, page 1731. A survey from Freeport to Franklin, 97 miles.

Annual Report of the Chief of Engineers for 1880, part 2, page 1767. An examination and survey from French Creek (Franklin, Pa.,) to Olean, N. Y., 129 miles.

Annual Report of the Chief of Engineers for 1893, part 3, page 2535. A preliminary examination for lock and dam at the most practicable point for navigation on Allegheny River between dam at Tarentum and Herr Island Dam.

Annual Report of the Chief of Engineers for 1893, part 3, page 2538. A preliminary examination for lock and dam in Allegheny River at or near Tarentum.

Annual Report of the Chief of Engineers for 1893, part 3, page 2540. A preliminary examination of Allegheny River from Olean, N. Y., to Warren, Pa., 65 miles.

Annual Report of the Chief of Engineers for 1899, part 3, page 2411. A preliminary examination and survey to determine what remaining portion of said river can be made navigable, and the number, location, and cost of the necessary dams therefor. The survey extended from Tarentum, at the head of pool navigation, to Oil City, 11[illegible] miles, and the report of examination above Oil City to the New York State line was based on the former survey of 1879, supplemented by further independent investigation.

All of the reports of examinations and surveys from 1876 until 1899, except that of a preliminary examination between Olean, N. Y., and Warren, Pa., published in the annual report of the Chief of Engineers for 1893, included recommendations favorable to the improvement of the river, both open channel and by means of locks and dams. The last report was made by Maj. Powell, and states that in his opinion slackwater improvement on that portion of the river from Natrona to Monterey, 56 miles, is worthy and justified by the interests of commerce involved.

The Allegheny River rises in Potter County, Pa.; flows northwestwardly into the State of New York about 8 miles southeast of Olean; thence westwardly through Olean to Salamanca, N. Y., a distance of about 30 miles, where it takes its general southwesterly course which it maintains to the mouth at Pittsburgh, Pa. Approximately 50 miles of the river is in the State of New York. The total length of the stream is about 317 miles and its drainage area approximately 11,400 square miles. Even in its natural state it was navigable for timber rafts and other floating com-

Digitized by Google

merce over almost its entire length, and steamboats have ascended as far as Olean, 256 miles. Considered in sections of 20 miles its descent never exceeds an average of about 5 feet per mile, and for 20 miles in either direction from Olean there is an average fall of less than 2 feet per mile. The average descent from Olean to Pittsburgh is approximately 2.8 feet per mile.

The portion of river under consideration in this examination extends from Natrona at the head of pool No. 3 to the Pennsylvania-New York State line, about 1.3 miles above Corydon, Pa., a distance of 190 miles. Beginning in 1879 this section of river has been improved for open-channel navigation by the removal from its bed of enormous quantities of huge bowlders and rocks which obstructed the channel over almost its entire length, and the construction of eight dikes or low dams for closing of duplicate channels at heads of islands or otherwise concentrating the low-water flow within narrower channels. Owing to a general decline in open-river navigation, involving both floating commerce, such as rafts of timber and lumber, new coal-boat bottoms, barges, etc., and steamboat navigation, the construction of dikes and dams ceased about 1900, and subsequent work has been limited to maintenance of the structures previously erected and of the open-river channel by the removal of such rock and snag obstructions as annually come to the surface. For the accomplishment of improvements of this nature the total amount expended on the entire river below the New York State line, including a dike erected in 1879 at the head of Six-Mile Island, in what is now pool No. 1, was $266,557.40. Between Natrona and the mouth, a distance of 24 miles, the river has been permanently improved by means of three locks and dams, of which Dam 1, at Twenty-second Street, Pittsburgh, is movable of the Chanoin type, having a 500-foot navigable pass and two bear-trap weirs, and Dams 2 and 3 are fixed structures. The cost of this slack-water improvement, including the destruction and subsequent reconstruction of Dam 3, owing to failure of its abutment, was $1,679,018.

The present examination covers the same territory and is for the same purpose as that reported upon by Maj. Powell in the Annual Report of the Chief of Engineers for 1899. On that occasion a most thorough and complete survey of the river from Tarentum, in pool No. 3, to Oil City, 134 miles above the mouth, was made. This survey was platted on 26 large scale sheets, and these reduced to a map of five sheets made to a scale of 1 inch=2,000 feet for general use and publication. These, together with an index sheet and profiles, show the river channel and proposed locations of locks and dams over the entire section of river covered by the survey. Principally from a study of the previous survey of 1879 and a further examination of the river between Oil City and the New York State line a table of proposed locations for locks and dams on that portion of the river was made and submitted in that report. In addition to the survey and examination showing the physical condition and characteristics of the stream, the report also includes a careful study of the geology of the region with a map showing the general geological conditions, and shows on the general map of survey the extent of mining operations in close proximity to the river.

The work in connection with that survey seems to have been so carefully and comprehensively executed, and within so recent a time, as to render its repetition unnecessary for the purpose of the present examination. As concerns the river itself practically no changes have taken place materially affecting its physical conditions. Accordingly the locations of locks and dams shown on the maps of the survey may be accepted as representing a thoroughly feasible project for the slack-water improvement of the river at least as far up as Oil City. As to the character of structure, which it is not the purpose of this report to enter upon, it may, however, be stated that the more recent practice favors concrete construction practically throughout as against timber-crib dam construction, which, together with the general advancement in the cost of materials and labor during the past 12 years, will doubtless increase the estimate of cost then made by fully 50 per cent.

This examination was commenced in the early part of June, when circular letters requesting information and the presentation of the views of interested parties throughout the valley were addressed to the executive heads of cities and towns, chambers of commerce, boards of trade, mining and industrial firms and corporations, parties with extensive navigation interests both along the stream and in the vicinity of Pittsburgh, Pa., etc. These requests called for data concerning the natural resources and industrial activities of the Allegheny Valley, together with the amount and value of its entire commerce and the probability of its partial diversion to an improved navigation in such event; also the area of land available for manufacturing purposes and other similar data bearing on the necessity and importance of the proposed improvement of the stream. Later a personal visit for the purpose of securing additional information was made in the month of August, the journey extending up as far as

Digitized by Google

Warren, 191 miles from the mouth, and comprising all of the important cities and towns above Kittanning.

The result of the efforts made in this direction, both as regards percentage of replies to letters sent and character of information received, together with the results of many interviews with prominent persons and interests in the larger centers of industry, especially those actually engaged in manufacturing and production, on their face appeared quite disappointing, particularly in view of the well-known interest and sentiment in favor of the further improvement of the river by those residing along its banks. In fact, the apparent general apathy seemed so inconsistent as to suggest some real or fancied cause for its existence. Accordingly, certain persons who heretofore have shown intense interest in the progress of the valley, especially as regards its navigation, were appealed to for an explanation. Some of these, without hesitation, stated that while there has always been a decided interest throughout the valley favorable to the improvement of the river by means of locks and dams in order that the natural resources of the Allegheny might be opened to competition with other near-by localities long since enjoying the free use of canalized rivers, yet, owing to the frequency of efforts put forth to secure the favorable action of Congress for the canalization of the Allegheny resulting from time to time in examinations and surveys, many of those most interested have become discouraged and disheartened. They feel that their efforts heretofore have brought about no practical results and that the improvement of the Allegheny at the present rate is too remote to justify further active effort on their part. That failure to secure the raising of low bridges at Pittsburgh in consequence of several public hearings conducted during the past 12 years has added materially to their gloomy view of the matter is also freely admitted.

While the above reasons no doubt express the feeling of a very great number of those whose interests would be most affected, past experience in matters associated with navigation interests has demonstrated beyond question that a larger percentage of those engaged in mining and manufacture and who depend wholly upon railroads for transportation feel that their interests would be endangered by the open advocacy of water competition with the only source of commercial movement now open to them. Accordingly, they are unable to see their way clear to give expression to their personal opinions and desires in such matter, and will probably so continue until competitive transportation facilities, either by land or water, are assured and they may no longer be subjected to oppression.

Considering, therefore, the apparent helplessness of the average rail shipper against the powerful influences which dominate his business and upon which he must for the present depend absolutely for success, his enforced attitude toward remedial measures, public or private, are neither to be wondered at nor rashly charged to his account. If at any time shippers and receivers of freight could be assured against interference with or discrimination against their interests, and, furthermore, that they would be given acceptable service by the railroads notwithstanding a possible diversion of part of their trade to other means of transportation, water-borne commerce in the Pittsburgh district would at once be greatly revived and those interested would feel at liberty to express their views freely on the subject. This under existing conditions may not reasonably be expected, and hence much valuable information concerning the Allegheny Valley, its resources and commerce, is not accessible.

Naturally this condition leads to the conclusion that eventually the transition from rail to water transportation will be abrupt, and will probably not occur until shippers are satisfied of the comprehensiveness and reliability of the facilities afforded for navigation, that they are ample to protect shipping interests from monopolistic retaliation in anyway calculated to injure or destroy their business interests. Such navigation facilities must necessarily comprise a system sufficiently extensive and continuous as to afford a market capable of supporting various lines of industry, if need be, to the practical exclusion of other means of transportation, and furnishing material aid to other favorably located interests which may find it advantageous to divide their shipments between rail and water. It is believed that this condition will not have been fulfilled until at least practically the entire Ohio River Basin has been comprehended in one complete, dependable navigation as now in considerable measure contemplated.

Applying directly to the Allegheny River, however, there are nevertheless not a few pronounced advocates of the immediate extension of the improvements already established on the lower portion of the stream in the construction of Dams 1, 2, and 3. Also is the fact noteworthy that these generally represent the larger interests, some of which, in a measure, have experienced the advantages of water transportation at least in a restricted or local way. Some of these have given free expression to their views and to a certain extent have unfolded their plans. Assuming that they are repre-

Digitized by Google

entative of a much larger general sentiment now withheld for reasons heretofore tated, the demand for this improvement appears to be sufficiently established to rarrant its serious consideration. Although confining their efforts and appeals paricularly to the Allegheny River some of the principal petitioners for its improvement lso have important interests on the Monongahela and Ohio Rivers, and it is manifest hat their ultimate aim is to secure not merely a restricted navigation enabling comunication with nearby markets, but rather that the radical improvement of the Alleheny may be accomplished simultaneously with the completion of the greater project n the Ohio, thus rendering the two available at the same time, which together with ther streams shall provide a more extensive and continuous navigation for the comaratively uninterrupted interchange of commodities among widely separated localiies made accessible through the improved river channels. In fact upon this fundaental principle as essential to successful navigation on an important scale navigation nterests are unanimously agreed.

With a comparatively small amount of dredging the three pools already established rill afford a sufficient navigable depth at lowest pool level for craft drawing 7 feet ver 24 miles from the mouth of the river during practically the entire year except at n occasional flood time or during portions of severe winters. On the average the time ss due to such causes will not exceed about two months per annum, and this usually at time when business is at its lowest ebb. On the open river above the influence of lackwater navigation is now confined to the favorable stages of the river due to natural ises. These occur for the most part in the early spring and occasionally late fall. s a rule summer rises, occurring between the middle of May and November, are nfrequent and of too short duration to justify an attempt at regular commercial novements. At the lower stages generally prevailing throughout the summer season here is insufficient depth for navigation of any kind except very light launches, kiffs, rowboats, etc. At stages when steamboats may navigate under the lower ridges craft drawing from 2 to 5 feet may frequently continue in service for several ays, or even a few weeks, at times of continuous high water. Floating commerce, s rafts, new barges, flats, coal-boat bottoms, house and trading boats, etc., may escend at stages of 1.5 feet and upward, and consequently enjoy a materially longer eason for their operations than steamboats, which latter now rarely ascend even as far s Oil City, 134 miles above the mouth.

It is beyond dispute that the greatest obstacle to a substantial movement of comnerce on the open channel of the Allegheny is the extremely short period of reasonbly assured navigable depth, being confined to about two months in the early spring, nd the uncertainty and unreliability of rises during the remainder of the year. For he past three years the river has reached a comparatively low stage—too low for navigatng with steamboats or the deeper-draft floating product—very early in the summer nd has maintained it almost without intermission until the latter part of December. Vext to low water and the undependableness of rises, ice effects an important difficulty o navigation. Being a mountain stream proceeding from the north, a hard frozen iver at low water of heavy floating ice at stages of 3 or more feet are the usual openhannel conditions during severe weather. These may obtain at any time in Deember, January, and February, but their average annual duration so as to interfere vith navigation is not in excess of about 60 days. Lastly as an impediment to navigaion certain low bridges seriously affect all classes of vessels equipped with power for ropulsion or hoisting, dredging, or sand-digging operations, and actually prohibit he use of the stream to many such craft in use on the adjoining rivers. However, he obstructive bridges are not so serious a consideration between Forty-third Street, Pittsburgh, and Oil City, 131 miles, as between Forty-third and Sixth Streets, Pittsurgh, less than 3 miles, since the number of the former is smaller and they are all of ight construction and for the most part old, requiring early renewal in any event. That they, even at their existing heights, will permit of a large commercial movement y water is evidenced by the fact that annually from 1,000,000 to 2,000,000 tons of reight are transported under one or more of those situated in the Pittsburgh Harbor.

Digitized by Google

The following table shows the location, headroom, and available width of navigable spans of bridges between the mouth of the river and the Pennsylvania-New York State line:

Name.	Distance above mouth.	Kind.	Number of span.	Pool and its elevation.	Channel span.		Remarks.
					Width between centers of piers.	Clear height above pool or low water.	
	Miles.				*Feet.*	*Feet.*	
Point	0.0	Highway	2		534.5	70.0	Under construction.
Sixth Street	.6	...do	2		445.0	32.0	90 feet from shore pier, near middle pier.
Seventh Street	.7	...do	4	Davis Island, 703 feet	330.0	35.0	Left half of span.
Ninth Street	.8	...do	5		209.0	33.6	All of middle span.
Fort Wayne R. R.	1.0	Railway	5		325.0	34.9	All of spans 1, and 5.
Sixteenth Street	1.3	Highway	4		210.0	31.9	In span 2.
Thirtieth Street	2.4	...do	3		302.0	36.0	At middle of span.
Pittsburgh Junction R. R.	2.7	Railway	4		206.0	34.4	At middle of span; 32.9 middle of span 3.
Forty-third Street	3.5	Highway	4	Herr Island; 703 feet.	244.0	27.7	At middle of span.
Sharpsburg	5.4	...do	5		366.0	52.4	
Highland Park	6.3	...do	4		450.0	75.0	Middle of span. Ends of span 55 feet.
Pennsylvania R. R. (Brilliant).	7.2	Railway	4		410.0	54.0	At middle pier near right span 4.
Oakmont	12.8	Highway	5	No. 2; 721 feet	[1] 475.0	50.0	All of channel span.
Pittsburgh, Bessemer & Lake Erie R. R.	14.0	Railway	4		520.0	57.0	
New Kensington	19.3	Highway	4	No. 3; 731.5 feet	415.0	51.5	
Freeport (highway)	28.7	...do	3		302.5	45.0	
Freeport (railway)	30.0	Railway	5		160.5	48.7	
Kittanning	45.6	Highway	5		181.4	24.3	
Allegheny & Western R. R.	51.2	Railway	6		450.0	57.0	
Pittsburgh & Shawmut R. R.	56.4	...do	4		400.0	61.4	Under construction.
East Brady	70.7	Highway	4		200.0	38.1	
Parker	85.0	...do	4		198.6	34.3	
Foxburg	87.8	Highway and railway.	3		176.7	35.2	
Emlenton	91.6	Highway	2		231.0	37.9	
Kennerdell	110.0	...do	3		260.0	56.0	
Franklin & Clearfield R. R.	121.0	Railway	7		304.0	66.0	
Big Rock	125.1	Highway	4		150.0	27.7	Permit requires [illegible] feet.
Franklin	126.4	...do	4	Elevations are from low water, natural river.	179.7	39.0	
Oil City, Rouse & Franklin R. R.	131.9	...do	6		413.0	56.0	
Oil City (suspension)	134.0	...do	3		510.3	36.3	
Oil City (relief)	134.1	...do	4		324.8	40.1	
Oil City (petroleum)	134.2	...do	3		347.0	38.0	
Allegheny Valley R. R.	134.7	Railway	3		229.0	27.8	
Tionesta	150.6	Highway	4		120.0	25.5	
Hickory	157.3	Railroad and highway.	4		161.5	23.2	
Tidioute	165.3	Highway	2		268.0	27.8	
Philadelphia & Erie R. R.	187.1	Railway	3		150.0	18.6	
Warren	187.7	Highway	1		452.0	24.4	
Pennsylvania R. R.	188.1	Railway	3		175.0	18.0	
Glade Run	189.9	Highway	4		142.0	20.2	
Great Bend (Pennsylvania R. R.).	197.7	Railway	5		158.5	23.1	
					[1] 110.0	.....	

[1] Normal to channel.

Digitized by Google

In one of the earlier reports on the proposed improvement of the Allegheny, a considerable discussion and some speculation were aroused respecting the probable effect of ice gorges on a system of locks and dams therein, and it was feared that special construction and protection might be required to prevent their destruction. However, Dams 2 and 3, constructed on a modern cross-section not then well known, have each withstood several heavy gorges and in no case have suffered any damage. Accordingly it is now considered certain that no great danger need be anticipated from that source.

Since the completion of the two Allegheny River fixed dams, a few years' experience in the operation of a limited series of movable dams in the Ohio River has fully demonstrated the remarkable value of the former as ice protectors to the latter. Therefore, the flow of newly formed ice into the Ohio was frequently so heavy as to force the lowering of the movable structures very early in the winter. However, thereafter the fixed-dam pools have invariably trapped all floating ice and held it until frozen and subsequently broken up by a sufficient rise to necessitate the lowering of Ohio dams for the season. Thus the Allegheny fixed dams have materially lengthened and rendered safer the more protracted winter operations of the system of movable structures below them.

That this condition may be vastly improved by the extension of the Allegheny River slackwater system there is practically no doubt. The Kiskiminetas River, the largest tributary of the Allegheny, with a drainage area of 1,846 square miles, empties into the main stream above Freeport, 30 miles above the mouth. It is always a dangerous factor, taken in connection with the Allegheny ice. Flowing from a southerly direction it usually delivers its ice far in advance of the Allegheny ice above Freeport. Prior to the completion of Dam 3, at Springdale, it generally brought the Allegheny ice below Freeport out with it, whereas since it has only succeeded in moving it to the head of Pool 3 and forming gorges up to its mouth above Freeport. The addition of Dam 4, at Natrona, would be of great advantage in that it would stop the Kiskiminetas ice in deep-pool water at its mouth, there to effect a more compact gorge, easier to dispose of in the deeper water and less dangerous to structures below. Of equal or even greater value would be the construction of Dam 5, and possibly Dam 6, above Kiskiminetas. These would retain all newly made floating ice above them at the lower stages of water, instead of permitting its accumulation in gorge form at or just below the mouth of the Kiskiminetas, there to await enlargement of the mass by the ice prematurely disgorged from that stream.

Respecting the Allegheny ice in general, it is a fact worthy of special mention that while it has broken up and come out as many as three times during a winter, it rarely breaks up more than twice and more frequently only once. Accordingly, the element of risk to river works is materially reduced from the popular belief.

Ordinarily, rises such as occur one or more times every year register from 6 to 8 feet at the New York-Pennsylvania State line, 12 to 15 feet at Oil City and Franklin, and 18 to 20 feet at Freeport, where the first official water gauge above Pool 3 is located. The extreme fluctuations, however, embracing those freshets or floods which are only experienced occasionally and frequently not for several years at a time, are shown in the following table for all gauges maintained by the United States Weather Bureau on the main stream:

Place.	Miles from mouth.	Minimum.		Maximum.	
		Stage.	Year.	Stage.	Year.
Warren	191	−1.1	1904	17.4	1865
Oil City	134	− .8	1881	21.0	1865
Parkers Landing	85	− .9	1894	28.0	1865
Freeport	29	− .7	1881	32.7	1891

At the mouth of the stream its minimum discharge is about 1,440 cubic feet per second, and its maximum measured discharge on March 15, 1907, was 236,834 cubic feet per second. From the viewpoint of discharge, therefore, the Allegheny is abundantly supplied for slackwater purposes as far up as it may be deemed expedient to extend it.

Taken as a whole, the Allegheny must be regarded as one of the Nation's most remarkable valleys, upon which nature has been lavish in the distribution of its rich products. Many regions there be which have been favored with better endowments in some respects, but from these the Allegheny differs in the diversity of its

Digitized by Google

gifts. Originally, almost the entire region was covered with timber of superior quality, principally white pine, hemlock, and oak, which, during more than a cen[illegible] has furnished billions of feet of its products to the markets of the land. This has largely been cut down, and yet the amount annually shipped and still standing is by no means small, save by comparison with the past. Meantime also a second growth, principally of hemlock and hardwoods, has sprung up and is already coming into [illegible]

This region was also the pioneer in the production of petroleum and natural [illegible] The Pennsylvania paraffin oil is of superior quality and commands a higher [illegible] than the lighter gravity and asphaltum base products of most other districts. [illegible] fluid was found in enormous quantity throughout practically the entire Allegheny Basin, and although drawn upon for more than half a century the production is important, aggregating about 9,000,000 barrels per annum, and its refinement [illegible] of the chief industries. The production of natural gas has also long been an extensive and valuable asset.

These three products, together with a good quality of sandstone, apply generally to almost the entire valley, along with favorable climatic conditions and a thin productive soil adapted to fruit growing, grasses, and some grains and other [illegible] products. In addition, however, nearly 100 miles of the lower portion of the valley are underlaid with the great productive mineral formation of the Pittsburgh seam including, to a greater or less extent, its several bituminous-coal strata, limestone in inexhaustible quantities, abundance of fire clay for building brick, and native iron ore containing from 30 to 45 per cent of metallic ore found extensively in the "Pipestone" vein overlying the limestone stratum.

For practically a century these mineral deposits have been worked, the yield amounting to many millions of tons. Nevertheless the impression in the aggregate has been large, and much the greater part still remains. At present coal and fire [illegible] alone are mined in large quantities. As heretofore, much of the coal is used here, while the remainder is shipped north by rail. Nearly all of the fire-clay product is used by the various brick companies, of which several very large concerns have been developed. Some native iron ore is still used by the Kittanning Iron & Steel [illegible] and some limestone locally, while other is shipped to the Pittsburgh market by [illegible] On the whole, however, the aggregate of these products is far below their previous output were a cheaper means of transportation afforded. Although confined principally to one company's operations, the glass-sand industry is by no means insignificant. The Pittsburgh Plate Glass Co. has for a considerable period shipped [illegible] quantities of such sand by rail from its quarries at Kennerdell to its mammoth [illegible] at Fort City, a distance of 60 miles.

In his report of 1899 Maj. Powell, after a very careful investigation, submitted the following list of commercial movements which at that time might reasonably be expected by water annually on an improved river:

	Tons
Fire clay and silica rock	[illegible]
Coal	[illegible]
Limestone	[illegible]
Iron ore	[illegible]
Glass sand	[illegible]
Building sand and gravel	[illegible]
Plate and other glass	[illegible]
Flour, feed, etc	[illegible]
Lumber	[illegible]
Wagons, agricultural implements, and hardware	[illegible]
Live stock	[illegible]
Hides	[illegible]
Marble and granite	[illegible]
Beer	[illegible]
Brick	[illegible]
Iron, steel, boilers, engines, etc	[illegible]
Building stone	[illegible]
General merchandise	[illegible]
Miscellaneous	[illegible]
Total	[illegible]

While it has been quite impracticable to obtain many statements from mining or manufacturing interests concerning their probable movements by water in the event of an improved river, yet sufficient has been gained from a few of the larger and more independent interests to furnish evidence of a much larger probable water-borne commerce than was anticipated 12 years ago.

Digitized by Google

One industrial company alone states that if water transportation were made available it could move annually by that method from its various mines and factories in the Allegheny Valley approximately 1,200,000 tons of coal, grinding and melting sand, limestone, lumber, straw, salt, gypsum, brick, and finished product, provided the improvement were extended to about 85 miles above the present head of slack-water. But if the improvement were only extended about 35 miles, then the above tonnage must be reduced by 50,000 to 100,000 tons per annum. A second corporation has purchased 24,000 acres of coal lands, and is endeavoring to increase this to 60,000 acres. It states that a conservative estimate of the amount of coal in the 24,000-acre holdings is 360,000,000 gross tons. The full development of the property contemplates at least 3,500,000 to 4,000,000 tons of coal per year, a considerable part of which, the company states, will be shipped by water if facilities for such transportation are afforded. Assuming, then, that only one-fourth of this may go by water, and that the probable aggregate water shipments of all other industries will at the beginning at least equal those of the two concerns above-mentioned, which is considered not improbable, a total water commerce of 3,000,000 to 5,000,000 tons may reasonably be expected, exclusive of nearly 2,000,000 tons annual commerce conducted on the pools already established.

In this connection it may safely be stated that the trade which will seek an outlet by water will not be drawn very largely from the present railroad traffic but will be a comparatively new trade developed in consequence of the newly established conditions. Not exactly that locks and dams must be provided in order to promote a river commerce, but rather that the extensive natural resources of the Allegheny Valley must continue to lie dormant, or at least develop very slowly, until cheaper transportation facilities are afforded. When the fact is realized that within a reasonable working distance from the Allegheny River for 100 miles from its mouth fully 3,000,000,000 tons of marketable coal yet remain to be taken out, after deducting 50 per cent of the field as mined, unminable, or barren, the tremendous possibilities of this region are quite apparent.

Comparing the three great industrial valleys converging at Pittsburgh, the Allegheny, considering its limited transportation facilities both by rail and water, has by no means fallen far behind in the development of its industries within recent years. However, while it has made creditable additions to its various enterprises above present limits of slackwater, notably at Warren, Oil City, Franklin, East Brady, Templeton, Kittanning, Ford City, and White Rock, much geater progress has been manifest along that portion of the river on which a permanent navigation has been established by means of locks and dams.

According to statements of the Pennsylvania Railroad Co. during six years ending with 1909, 7 new coal mines were opened above the Kiskiminetas, with an annual output of about 91,000 tons. In the same territory 16 mines were previously in operation, of which 2 had been abandoned, leaving a total of 21 mines operating at that time with an aggregate annual tonnage of 477,079. In addition there are annually shipped nearly 2,500,000 tons of coal from the Pittsburgh district and received from other railroads. On the two Pennsylvania railroad lines between the Kiskiminetas and Pittsburgh 1,350,000 tons of coal originate annually.

During the same period there were established 38 new industries between the Kiskiminetas and Pittsburgh, on both sides of the river, whose annual freight movements approximate 240,000 tons. The larger of these comprise the Best Manufacturing Co., Oakmont; West Penn Steel Co. and Allegheny Steel Co., Brackenridge; Puddling Department, Crucible Steel Co., Pittsburgh; Crescent Forging Co., Oakmont; Standard Equipment Co., New Kensington; Boyd Bros. Coal Co., Valley Camp; and Enameled Metal Co., Sharpsburg, all on the improved portion of the river. Including 2 of the above companies, 10 of the largest concerns, located on the right bank of the river on the upstream portion of pool 3, have an aggregate annual freight movement of 1,160,000 tons. Within 20 miles above the head of pool 3 there are located the Pennsylvania Salt Manufacturing Co., Natrona; Braeburn Steel Co., Braeburn; Guckenheimer Distilleries, Freeport; Schenley Distillery, Alladin; Pittsburgh-Buffalo Co. and United States Sewer Pipe Co., White Rock; Pittsburgh Plate Glass Co. and Ford Pottery Co., Ford City; Kittanning Brewing Co., Brick & Fire Clay Co., Clay Manufacturing Co., Clay Products Co., Iron & Steel Co., and the Wick China Co., and Pittsburgh Writing Machine Co., at Kittanning, and others. The annual freight tonnage of these is considerably in excess of 1,000,000, exclusive of other mining operations.

The Pennsylvania Railroad Co. practically controls the commerce of the Allegheny Valley. Its Conemaugh and Allegheny divisions extend by one line from Pittsburgh to Olean, N. Y., 256 miles, and by another on the opposite bank from Pittsburgh to Kiskiminetas Junction, 30 miles, and the Philadelphia & Erie Railroad from Glade to Irvineton, about 15 miles, through the city of Warren. These have important main or branch line connections with other prominent localities or cities. The only

Digitized by Google

other completed railroad of importance is the New York Central, extending from Oil City downstream about 18 miles and passing through the city of Franklin. The Erie Railroad follows the river from Franklin to Oil City, a distance of 7 miles. The Buffalo, Rochester & Pittsburgh Railroad crosses the river at Mosgrove, but again leaves the valley about 3 miles below. The Pittsburgh, Bessemer & Lake Erie Railroad crosses 14 miles above the mouth of the Allegheny at the elevation of the hill tops, but maintains no connection with the valley below. The Baltimore & Ohio Railroad crosses at Pittsburgh and follows upstream about 3 miles to Pine Creek. It again touches the river between Parker and Foxburg, about 4 miles, at which latter place its Clarion branch recrosses the stream. Another railroad extends from Warren to Dunkirk, and several others cross or follow the valley for considerable distances above the New York State line.

One of the most valuable recent additions to the railroads of the Allegheny Valley is the Pittsburgh & Shawmut Railroad, extending from Freeport to Mahoning, 27 miles, whence it traverses the Mahoning Valley. This line, however, is not yet completed, and its construction has been suspended for several months. Its greatest worth lies in the fact that it is located on the opposite bank from the Pennsylvania Railroad and passes through one of the valley's richest mineral sections.

From the foregoing it will be noted that the railroad interests have held the Allegheny region in sufficient esteem to traverse it from numerous angles, and notwithstanding their oft-repeated assertions that the roads do not pay, others are still being constructed. That with such splendid railroad facilities the natural resources of this region are not being more extensively developed can apparently only be attributed to the fact that there is no freight competition and that the existing rates are higher than the production will bear and yield a reasonable profit.

The previous survey and investigations forming the basis of Maj. Powell's report in 1898 thoroughly established the practicability of slack-water extension on the Allegheny River as regards its physical characteristics. The only objectionable feature apparent was the annual interference with its use during an average of two months when the pools would be frozen. However, this disadvantage is common to all navigable waters in the northern portion of the country except in parts of the extreme northwest.

The slack-water extension of the Allegheny is most vigorously urged by three classes of interests, viz, the owners of the mineral resources, those who have established manufactories, and those contemplating the establishment of manufacturing enterprises. The demand for mill and factory sites in close proximity to Pittsburgh has long since exhausted the supply, except for plants of small proportions, and the comparative depletion of those available for 50 miles up the Monongahela and for almost a like distance down the Ohio has attracted attention to the Allegheny above the present head of improved navigation. These thousands of acres, suitable for manufacturing purposes, may still be procured at reasonable prices.

The most valuable natural resources of the valley are located between Kittanning and East Brady, a distance of 25 miles, although the northerly edge of the productive strata along the course of the river is approximately at Emlenton, 92 miles above the mouth. The more important coal beds, however, extend from the mouth of the stream. The value of these products to the markets now being made accessible by water is an important consideration not only to the Allegheny Valley but to the lower rivers as well. The most urgent call by the various mining and manufacturing interests for an improved navigation is on the portion of the river between the head of pool 3 and Mahoning, a distance of 31 miles. As determined from the survey reported in 1898, five additional locks and dams will be required to extend slack water over this section of the river, overcoming a fall of 64 feet. The interests of commerce involved in my opinion justify and render worthy the immediate extension of the improvement by means of locks and dams to Mahoning. With the completion of slack water to Mahoning and the development of commerce thereon it is probable that its further extension to Emlenton at the edge of the productive mineral formation, a distance of 36 miles, will then be justified by commercial interests. While the importance of the cities and industries located above would appear to warrant serious consideration of the extension of slack water from Emlenton to Oil City, a distance of 42 miles, yet the interests of commerce do not seem to justify the undertaking at this time. Also the radical improvement of the stream above Oil City to the New York State line is not now deemed worthy.

Owing to the limited use of the open channel for navigation purposes no modern terminal or transfer facilities, aside from limited landing wharves at the principal towns and cities, exist along the portion of river under consideration. As a rule the landing privileges at these places are free or the wharfage charges insignificant. In several instances coal tipples established for railroad transportation, being located near the bank of the river, could at small cost be extended or adjusted for river shipments.

Digitized by Google

In general the river frontage is still in the possession of private land owners and is therefore available for landing, wharfage, transfer, or other terminal uses. In any event there is no indication of any disposition to acquire river frontage for monopolistic purposes.

Extensive inquiry has developed nothing to indicate the existence of a demand for water-power privileges in connection with slack-water dams, although strenuous efforts have recently been made to obtain such rights on a large scale on some of the important tributary streams. It is probable that the large supply of bituminous coal and natural gas at low cost has been an important factor in this determination. As fuel becomes scarcer and its cost higher no doubt there will come a demand for water power, but that time is likely somewhat in the future.

It is believed that sufficient data is available from the former survey for the determination of a definite plan and estimate of the locks and dams required to extend slack water over the portion of river deemed worthy.

Respectfully submitted.

J. W. ARRAS,
Assistant Engineer.

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF THE PITTSBURGH PLATE GLASS CO.

PITTSBURGH PLATE GLASS CO.,
Pittsburgh, Pa., June 23, 1911.

DEAR SIR: Replying to your favor of June 8, in which you request us to furnish you with such information as may be available concerning the extent of improvements desired upon the Allegheny River, also some idea as to the tonnage we could move by water were these improvements to be made, we take pleasure in replying as follows:

That this company would receive the maximum benefits if the Allegheny River were improved to a point near Franklin, Pa., as we are at this time operating a large sand quarry some 15 to 20 miles downstream therefrom, at a point known as Kennerdell, Venango County. The supply of sand available at that place is very large, and quality that is adapted to utilization both as grinding sand and melting sand in the manufacture of plate glass.

Were such improvements to be made so that this company could avail itself of water transportation from that sand plant to its various works located upon the Allegheny River, based upon normal conditions of manufacture of to-day, between 500,000 and 600,000 tons of material, such as sand, coal, and limestone, could be moved by water. In addition to that, we estimate that from 200,000 to 300,000 tons of coal mined from the mines of the company located upon the Allegheny River could also be shipped by water route.

In addition to the above-named materials, a considerable tonnage of lumber, straw, salt, gypsum, brick, and finished product would no doubt fall into the class available for river transportation, increasing the tonnage above mentioned probably to the extent of 50 per cent.

Were the improvements on the Allegheny River to extend only to a point some 20 miles above our works at Ford City, and as a result not be available for the transportation of sand from our quarry at Kennerdell, but, nevertheless, to include the mines of this company at Mosgrove, some 10 miles above Kittanning, the tonnage as first mentioned would be reduced to the extent of from 50,000 to 100,000 tons per annum.

Our company strongly indorses any movement intended to increase facilities of water transportation and improved general conditions of navigation of the Allegheny River. The utility of our waterways as means of transportation is one of the most important developments, in our opinion, to be made by our Federal Government. The wisdom of this development is very plainly shown by the locations and operation of the large industries situated upon the Monongahela River. The census statistics show the enormous growth of population during the period of slack water upon that river, and it has appeared to us as a matter of injustice to the industries and the property owners on the Allegheny River that the improvements of that river have been deferred even as long as now.

Should you desire further information of a more detailed character, or if it is possible for us to show our interest in this field by cooperation of any character, we shall be very much pleased to have you call upon us.

Yours, very truly,

W. L. CLAUSE, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

Digitized by Google

LETTER OF ALLEGHENY RIVER BOATMEN'S ASSOCIATION.

ALLEGHENY RIVER BOATMEN'S ASSOCIATION,
Hoboken, Pa., June 23, 1911

DEAR SIR: A notice came stating that the river and harbor act, approved Februar 27, 1911, providing for a preliminary examination of Allegheny River, Pa., with view to the construction of additional locks and dams which has been assigned the Pittsburgh office for the importance of obtaining information as may be availa concerning the extent of improvements desired by interested parties, etc. Now, we have up the valley stone of the finest quality, some of which in large quantity th can be ground, making a No. 1 white sand; there is fine molding sand, fire cl limestone, oil, coal, timber, etc., which are very valuable, but can not be get market owing to the high railroad rates, which, if shipped by water, would be do and parties could compete with others and have fair profit. * * *

Respectfully,

HUGH SIMONS, *Secretary*

Mr. W. B. RODGERS.

LETTER OF THE ALLEGHENY RIVER MINING CO.

ALLEGHENY RIVER MINING CO.,
Kittanning, Pa., July 7, 1911

DEAR SIR: In reply to your official notice of June 8 in regard to the proposed exa ination of the Allegheny River with a view to the construction of additional lo and dams for slackwater navigation, and in which you request information concern the extent of the improvements desired and the resources made available from so works, I beg to advise you that the Allegheny River Mining Co. now owns 24 acres of coal lands along the Allegheny River between Freeport and Mahoning is engaged in rounding out its holdings so that its area will approximate 60,000 a of coal. A considerable portion of this acreage has two workable seams of coal, av aging 4 feet in thickness, known as the Freeport and Kittanning veins and w are renowned for their qualities as steam coal. A conservative estimate of the am of coal not owned and under the control of the Allegheny River Mining Co. al the river is 360,000,000 gross tons.

The development of this property is under way at two points near the mouth Nicholson Run, and a third operation is in course of development at Furnace Ru Five more operations are contemplated along the river between Freeport and Mah ing to fully develop the territory. These coal measures are underlaid with sple fire clays of the same quality and in as abundant quantities as are now found on east bank of the Allegheny River, from which sewer pipe and brick of high gra and of many different varieties in color are now extensively made. In this terri and adjacent to the river are several very fine manufacturing sites, which a kn edge of the Pittsburgh district leads me to believe are the most desirable unoccu tracts for such purposes in the entire Pittsburgh district, and upon which large s and iron, as well as other correlated industries, are now proposed to be establi

Up to the present time the splendid natural resources along the Allegheny R have not been enabled to come into competition with similar products from the te tory tributary to the Monongahela River, because the present extent of slackw navigation on the Allegheny River is so limited that no real benefits can be der nor can there be an incentive for their development until the opportunity is afo by the Government in providing suitable navigation facilities. It will require improvement of the river before the wealth of this locality can be developed on equal footing with regions possessing no better or more extensive natural resour but enjoying facilities which the Government has already provided to widen the ma ket for what it produces.

It would be impossible to estimate in dollars and cents the benefit to Armstr County if it had adequate facilities in the way of water transportation. So far as Allegheny River Mining Co. is concerned, and for which I speak, we are absolu shut out at the present time from competing with the great tonnage of coal that m down the Ohio River to Western and Southern ports, because we have no facili for water transportation, and we are therefore compelled to depend entirely up northern outlet for our products. With the full development of our property output should be not less than 3,500,000 to 4,000,000 tons of coal per annum, a siderable part of which ought to find its way to Southern markets, if we had the fa ties which would enable us to transport by water.

Digitized by Google

By reason of the present building of that part of the Pittsburgh & Shawmut Railroad between Mahoning and Freeport we will be enabled to make delivery of our coal products to the railroad company at different points along the river for shipment to Freeport, at which point delivery to coal barges could be conveniently made; therefore, if the slackwater improvement could be made only as far as Freeport, it would be of great benefit to us; but by reason of the other industries incident to clay products, by other coal-mining interests, and from the various existing and proposed manufactories of all kinds, it would, of course, be very desirable to have this work carried as far north as Mahoning.

The latent possibilities of this section of the State adjoining the Allegheny River are too little understood, and their present backward condition is entirely due to want of facilities. I most earnestly solicit the favorable consideration of the matter by yourself and by the Rivers and Harbors Committee, whose act has authorized an inquiry into this subject.

Very truly, yours,

DWIGHT C. MORGAN, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF THE FRANKLIN STEEL COMPANY.

FRANKLIN STEEL CO.,
Franklin, Pa., June 27, 1911.

DEAR SIR: Replying to your favor of the 24th, regarding the approximate tonnage that might be diverted to the water route in case the Government improved the Allegheny River, would say that our shipments at the present time are averaging about 1,500 tons a month, and although we could not say definitely just what portion of this could be handled via the water route, we believe that this would amount to at least one-third, or approximately 500 tons a month.

We ship a good deal into Cincinnati, Louisville, Kansas City, also a limited amount into Oklahoma, Louisiana, and Texas, and we believe that if the Allegheny River should be made navigable, the more favorable freight rates that we could obtain would enable us to very largely increase our business in the South and Southwest.

Very truly, yours,

C. F. MACKEY, *Assistant Manager.*

Mr. CHAS. A. STEELE,
City Treasurer, Franklin, Pa.

LETTER OF MESSRS. WHEELER & DUSENBURY.

ENDEAVOR, PA., *July 10, 1911.*

DEAR SIR: Replying to your inquiry of last month, I would state that we are interested in a barge yard, which turns out about 40 coal barges per annum, with some coal flats, and occasionally a steamboat hull. These of course are transported by water. We also ship about 20 cords of pulp wood per diem to Steubenville, Ohio, by rail. This would go by water if we had good water communication. We also ship about 5,000 cords of pulp wood per annum to other points.

We manufacture and sell 25,000,000 feet of lumber per annum, at least 6,000,000 lath, and 2,500,000 shingles. Much of this would go by water if we had it.

The most we care for at present is to have the channel cleared out and additional wing dams for the benefit of the descending traffic.

Yours, very truly,

WHEELER & DUSENBURY.

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

Digitized by Google

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF ALLEGHENY RIVER, PA.

UNITED STATES ENGINEER OFFICE,
Pittsburgh, Pa., January 19, 1912.

SIR: In compliance with department instructions of December 22, 1911, I have the honor to submit the following report on plan and estimate of cost of improvement of the Allegheny River, Pa., with a view to the construction of additional locks and dams, under the provision of law contained in the river and harbor act of February 27, 1911.

In the report of preliminary examination, made under date of November 11, 1911, I gave an account of the existing project and commerce on this river, described the physical conditions, and expressed the view that the river is worthy of further improvement to the extent of constructing five additional locks and dams, extending slackwater about 35 miles upstream from its present upper limit at Natrona, which is about 24 miles from the mouth. The Board of Engineers for Rivers and Harbors concurred in this view, provided the cost should not be excessive, and recommended the authorization of an estimate, with the suggestion—

> that the district officer consider and report whether a less number than five additional locks and dams would not adequately serve prospective commercial needs and afford a means of testing the value of a further extension of slackwater.

The locks and dams are to be of concrete of usual design, founded on rock where it is available at a reasonable depth, otherwise on gravel and round piles, protected by sheet piling and, where necessary by timber cribs filled with rock. The lock walls are given a guard of 10 feet, and the useful chamber dimensions are 56 by 360 feet, the same as the standard size for recent construction on the Monongahela River. The project depth on the Allegheny River is 7 feet for pool at crest of dam, but the volume of discharge will usually give 8 feet, which is the same as on the lower Monongahela River. The estimates include upper and lower guide walls 200 feet long and upper guard cribs 200 feet long.

The estimates of cost are based on the following unit prices:

Rock excavation	per cubic yard	$2.50
Gravel excavation	do	.50
Gravel filling	do	.40
Stone filling	do	2.50
Round piling	per linear foot	.50
Sheet piling	per M feet b. m.	70.00
Oak timber	do	85.00
Hemlock timber	do	50.00
Driftbolts and bolts	per pound	.04
Cast-iron washers	do	.03
Concrete	per cubic yard	7.00
Paving	per square yard	1.50
2 lock keepers' houses, at $4,500 each		9,000.00
Turbo-compressor power plant		7,700.00
Lock gates, valves, and operating machinery		20,508.00

Engineering and contingencies, 15 per cent.

The cost of maintenance and operation will depend upon the amount of commerce, and is estimated to vary from a minimum of about $5,000 a year for each lock and dam to as much as $12,000 a year for a traffic of four or five million tons.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

The five additional locks and dams recommended, Nos. 4 to 8, inclusive, are indicated approximately on the accompanying drawing. Their location, estimated cost, etc., are given in the following table:

No.	Location.	Distance from mouth.	Lift.	Total cost (concrete construction).
		Miles.	*Feet.*	
4	Natrona	24.0	12	$483,000
5	Near Murphys Island	31.6	12	580,000
6	Near Clinton	37.0	12	619,000
7	Kittanning	46.0	13	580,000
8	Near Mosgrove	53.3	15	526,000
				2,788,000

Annual cost of maintenance, $25,000 to $60,000.

In order to obtain additional information bearing on the question suggested by the Board of Engineers for Rivers and Harbors as to the number of locks and dams for which provision should now be made, this matter was brought to the attention of interested parties with request for data, as follows:

(*a*) Your present annual rail receipts and shipments, in tons.
(*b*) The amount of freight which you might ship and receive by water in the event of slack-water extension.
(*c*) The upstream limit of the improvement required to accommodate your traffic.
(*d*) And any other data you may have bearing upon the distance to which slack-water should be extended.

In response to this request a number of letters [1] have been received and copies of them are transmitted herewith.

Assistant Engineer J. W. Arras has submitted a report giving the results of his study of this question, as follows:

The territory designed to be affected by the proposed locks and dams extends from Natrona, at the head of existing slackwater, to Rimerton, about 5 miles above Mahoning, a distance of about 36 miles. From an industrial or commercial point of view this section of valley naturally resolves itself into three divisions. The first or lowermost of these may be said to extend from Natrona to the downstream limit of Ford City, about 17 miles. The middle division, which for convenience may be designated as the Kittanning district, extends thence to Cowanshannock, 8 miles. And the uppermost division extends thence to Rimerton, at the head of proposed pool 8, approximately 11 miles.

The first-described district, as compared with the valley above and below it, is in considerable part undeveloped. Its principal industries at present are the Guckenheimer and Schenley distilleries, at Freeport and near Kiskiminetas Junction, respectively; the Pittsburgh-Buffalo Co. and United States Sewer Pipe Co., at White Rock; the distillery at Logansport, and several coal mines in active operation at various places. Although even an approximate estimate of the annual rail tonnage of this section is not available, it is known to be large and will readily exceed 1,000,000 tons, to which a material increase is promised, especially by mining interests, in the event of slackwater navigation. The natural conditions for the development of this district to the same advanced state as below Natrona and in the Kittanning district are equal to those of the latter in every respect except possibly as to diversity of mineral resources at and above Kittanning. Also the sites for manufacturing and residence purposes are quite as extensive and desirable. The leading representatives of the larger interests above and below this district maintain that its development along all industrial lines is sure to follow immediately upon the assurance of an improved waterway enabling the owners of the properties to enter into competition with like industries in more favored localities. From credible sources it is learned

[1] Only 10 of the 45 letters received are printed.

Digitized by Google

that fully 50 per cent of the coal within reasonable hauling distance of the river has been taken up in this district during the past few years, and that some extensive manufacturing enterprises are in contemplation as far up as the head of pool 5.

The Kittanning district is a large and progressive community as to population and mining, manufacturing, and other commercial industries, embracing Kittanning, the county seat of Armstrong County, Wick Borough, Ford City, Manorville, and Cowanshannock, all situate on the left bank of the river along the Conemaugh division of the Pennsylvania Railroad. Next to the region between Natrona and the mouth of the Allegheny, 24 miles, which forms practically one continuous industrial and residence community, the Kittanning district is the most important section of the Allegheny Valley south of Franklin and Oil City. While other causes may have contributed to the establishment of this important commercial center, there can be little doubt but that its location within the southern limit of the productive mineral region of the valley was the strongest factor in its development and progress. And this notwithstanding its adverse transportation conditions.

The principal industries in this district include the Kittanning Iron & Steel Co., Pittsburgh Plate Glass Co., Kittanning Brick & Fire Clay Co., Pennsylvania Clay Products Co., Kittanning Plate Glass Co., Hoey & Gallaher Foundry & Machine Co., Ford Pottery Co., Pennsylvania, or Wick, China Co., Daugherty Bros. Brick Co., Kittanning Clay Manufacturing Co., Elk Brewing Co., Pittsburgh Writing Machine Co., Kittanning Brewing Co., Fawcus Machine Co., and others. These and numerous coal, fire clay and limestone mining companies, aggregating at least 50 concerns, employ, when running at full capacity, about 7,000 persons, with a labor roll of more than $500,000 monthly.

In the report of preliminary examination of the Allegheny River it was stated that present commercial movements of the more important industries, exclusive of mines, in the Kittanning district and intervening territory below it to Natrona would exceed 1,000,000 tons per annum. More recent information, however, develops the fact that three companies at Kittanning and Ford City, namely, The Kittanning Iron & Steel Co., Kittanning Brick and Fire Clay Co., and the Pittsburgh Plate Glass Co., alone exceed 1,000,000 tons annually, exclusive of a large local haulage. It is therefore assumed to be a conservative estimate that present commercial movements in the Kittanning District alone exceed 2,000,000 tons annually. In considering the commercial activities of the district, however, the fact must not be overlooked that the operations, and especially the mining developments, are confined to only a portion of the left bank of the river.

The upper district, extending to Rimerton, is, like the first described above Natrona, largely undeveloped, save for the Harbison-Walker Refractories Co. and some smaller manufacturing concerns and several coal, limestone, and clay mining companies. It, however, lies wholly within the valley's richest mineral belt, and a large percentage of the properties have already been taken up by substantial companies, which will speedily develop them as better transportation facilities are afforded.

From the foregoing it becomes apparent that the main objective in the present consideration of the extension of the Allegheny River improvement for a reasonable distance is the Kittanning district, with its large and diversified industrial interests and mineral developments and resources, and their prospective enlargement. But to reach that territory will necessitate the construction of Dams 4, 5, and 6. Pool 4 alone would furnish a navigable depth to Murphys Island, thus accommodating Freeport and the Guckenheimer and other interests there located, the Schenley distillery, and several coal mines, and would enable the Pittsburgh & Shawmut Railroad and Allegheny River Mining Co. interest to derive the minimum advantages of navigation by transshipping at the southern terminus of their railway. With the addition of pool 5 a navigable depth would be extended to Nicholson Island, affording navigation to the Pittsburgh-Buffalo Co., United States Sewer Pipe Co., Provident Coke & Mining Co., and the town of Clinton where some extensive industries are in contemplation. And pool 6 would extend slack water to Kittanning but not to a sufficient depth through the Kittanning district.

Nothing short of three additional locks and dams will therefore be of direct or material benefit to the district most in need of slack water, and which because of its manifold business interests and extensive freight movements and future promise seems to justify altogether the cost of the improvement. While each additional structure above Dam 3 will result in added benefit to the valley in material increase to its water-borne commerce, yet if a really important river traffic is to obtain on the lower Allegheny it would appear absolutely necessary to extend the improvement at least into the Kittanning district. Not only is this true because of the present volume of trade in that locality, but also because its distance from the principal market at Pittsburgh will readily justify the adoption of transportation by water, whereas for

Digitized by Google

much shorter distances the saving in transportation charges is not so inviting as a financial factor.

While upon first thought the impression may obtain that Dams 7 and 8 are less important than those previously discussed, and perhaps at the present might be omitted without seriously affecting the value of the improvement below, yet upon more careful investigation and consideration of all of the interests involved the necessity for their authorization in connection with those below is difficult to avoid. Pool 6, as has been stated, will extend a 7-foot depth only to the foot of Castaway Ripple, at the Kittanning Highway Bridge, or 4 miles below Cowanshannock. Thus a navigation of materially less depth than 7 feet is afforded even to North Kittanning and Wick Borough industries, some of which, as the Kittanning Brick & Fire Clay Co. and Kittanning Plate Glass Co., are among the most important in the district. Thus having extended navigation into this field, failure to carry its practical benefits throughout its entire length would doubtless be open to criticism as a questionable economic or business policy.

However, pool 7 would extend a 7-foot slack-water depth beyond Cowanshannock and to a point slightly above Mosgrove, nearly 7½ miles above Kittanning, and pool 8 to Rimerton, a farther distance of approximately 8 miles. Necessarily arguments in favor of Dams 7 and 8 must rest primarily upon the assumption of favorable action concerning those below. Nevertheless it is important to note that already some of the larger manufacturing companies in and adjacent to Kittanning, which hitherto have operated their plants on short haulage of such local minerals as they required, have practically exhausted their near-by holdings. For the most part these have either secured undeveloped properties farther up the valley, lying within the limits of pools 7 and 8, or they have decided to obtain their future supply of raw materials from that section if practicable. The Pittsburgh Plate Glass Co. has for some time been shipping coal by rail from its mines at Mosgrove, immediately below the proposed location of Dam 8, and is also anxious to secure its grinding sand from proposed pool 7 as soon as possible. Since all of the manufactories are now along the line of the Pennsylvania Railroad on the left bank of the river, it is a matter of vital concern to those contemplating the purchase of mineral deposits as regards investments along the right bank until assured of slack-water facilities.

The most diversified and valuable mineral deposits of the Allegheny Valley are located between Kittanning and East Brady, a distance of 25 miles, or extending 10 miles farther north than the head of proposed pool 8. The various seams or beds of the deposits in this portion of the mineral belt are set forth in considerable detail in a letter[1] submitted by Orr Buffington, Esq., for the Business Men's Exchange of Kittanning, to which special attention is invited. To carry the navigation improvement entirely across this richest portion of the mineral belt to East Brady would require two additional dams, namely, Nos. 9 and 10. Between Rimerton and East Brady some of the most extensive coal-mining operations of the valley are being conducted, and other important industries have been established. Also there are annually shipped by rail from Bradys Bend over 900,000 tons of coal and more than 200,000 tons of limestone, and arrangements are reported to be practically completed for an annual shipment of more than 1,000,000 tons of limestone by the Pittsburgh Limestone Co. All of these, states the owner of the property, could be better transported by water.

In view of these facts it would appear no longer to be a question concerning the extension of navigation to Kittanning, nor yet of the addition of Dams 7 and 8, but rather whether or not Dams 9 and 10 should not also be recommended for construction along with those already urged for the benefit of the vast and widespread interests involved as manifest in the existing and prospective commerce in this locality.

Materially affecting the question of slack-water extension on the Allegheny River the fact is worthy of serious consideration that a very large percentage of the coal in the Monongahela Valley and in proximity to the railroad lines running east and south from Pittsburgh is owned or controlled by a comparatively small number of very large corporations. Competition with these, because of their friendly relations to or affiliations with the transportation companies, is said to be possible on the part of independent operators only by means of water transportation. However, the coal in the Allegheny Valley is almost wholly in the hands of a reasonably large number of independent concerns or of the small tract land proprietors, between whom it appears to be about equally divided.

Of even greater significance in this connection is the situation affecting the consumption of limestone for furnace flux in the Pittsburgh steel district. The use there of this product is estimated to be, under normal conditions, from 5,000,000 to 6,000,000 tons annually. This is now received by rail, principally from the Allegheny Mountains, east, or the Beaver Valley, northwest, of Pittsburgh, whence the average rail

[1] Not printed.

Digitized by Google

rate per ton is 65 cents. The Allegheny Valley between Kittanning and East Brady abounds in limestone of superior quality for fluxing purposes, which could be shipped by water into the Pittsburgh district at an average of 20 cents or less per ton. Accordingly, there is possible a saving in transportation on this commodity for flux alone of from $2,500,000 to $3,000,000 per annum, provided an improved navigation be extended to East Brady.

The recent further investigation of the proposed extension of improvement of the Allegheny River has developed a much livelier interest in its favor than heretofore among all classes of business interests and persons even as far as East Brady, as evidenced by the receipt of numerous communications furnishing statistics of existing commerce, with prospective increases and new developments in contemplation, probable river shipments in the event of slack water and general information of value relating to the valley's industries, resources, etc. While many valuable letters have been received from the smaller interests and private parties, only the more important facts have been emphasized in this report. Although much statistical information has been received, yet on the whole it is insufficient for furnishing a comprehensive statement of the present commercial movements covering the territory under consideration between Natrona and Rimerton, or the probable amount of traffic which would move by water were ample facilities provided. However, the fact has been developed that the present annual movements of commodities is materially greater than was previously supposed, and also that the estimate, given in report of preliminary examination, of 3,000,000 to 5,000,000 tons water-borne commerce at the beginning, in consequence of the addition of five locks and dams, was amply conservative.

This discussion presents the situation quite fully and makes it apparent that at least four additional locks and dams are required to serve the Kittanning district, which is the region of greatest industrial activity beyond the present limits of slackwater. Moreover, the present very heavy shipments of limestone from Bradys Bend to the Pittsburgh district indicate that with the growing development of the very rich natural resources of this section it will become necessary in the near future to provide additional slackwater by the construction of Dams 9 and 10. In view of all the conditions it is believed that there is sufficient ground for extending the project now so as to include the five additional locks and dams recommended on preliminary examination.

Estimating 3 per cent interest on capital investment and annual maintenance at $60,000, the total annual charge would amount to $143,640. Assuming a yearly commerce of 3,000,000 tons, the cost of the improvement would be slightly less than 5 cents a ton. The saving effected by water transportation can be estimated conservatively at from 25 to 40 cents a ton.

In my opinion it is advisable for the United States to undertake the further improvement of the Allegheny River by the construction of five additional locks and dams at an estimated cost of about $2,788,000.

The work should be prosecuted at such a rate as to complete it in five years. This can be done to best advantage by commencing two dams the first year, two dams the second year, and one dam the third year, and allowing three years for the construction of each lock and dam. In order to carry out this program the initial appropriation should provide $300,000 in cash and contract authorization amounting to an additional sum of $800,000.

Very respectfully, your obedient servant,

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

Digitized by Google

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 29, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The district officer presents herein an estimate for the improvement of the Allegheny River by five additional locks and dams, as contemplated in the report on preliminary examination, in the sum of $2,788,000, and an annual maintenance charge of $25,000 to $60,000, depending upon the amount of navigation on the proposed improved reach. He discusses the question of the adequacy of a less number than five additional locks and dams, and concludes, after a careful analysis of commercial conditions and the business to be effected by the proposed improvement, that no less a number than five would adequately serve prospective commercial needs.

He believes that improvement to the full extent proposed is justifiable, and with a view to completing the work in five years he recommends an initial appropriation of $300,000 in cash and a contract authorization amounting to an additional sum of $800,000. It appears from the further investigations made in connection with preparing the estimate of cost that the commercial development adjacent to the section over which improvement is contemplated and the amount of commerce that may be anticipated are greater than estimated at the time the preliminary examination was made.

It is believed from the facts presented that commensurate benefits to general commerce and navigation may reasonably be expected to result from the proposed improvement, and the board therefore concurs with the district officer, who is also division engineer, in the opinion that it is advisable for the United States to undertake the improvement proposed at an estimated cost of $2,788,000, with an annual maintenance charge of from $25,000 to $60,000. It also concurs in recommending that an initial appropriation of $300,000 be made, with contract authorization of $800,000 additional.

There are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of commerce and navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

LETTER OF ALLEGHENY RIVER IMPROVEMENT ASSOCIATION.

ALLEGHENY RIVER IMPROVEMENT ASSOCIATION.
Brady's Bend, Pa., January 4, 1912.

DEAR SIR: The Allegheny River Improvement Association desires to be placed on record as heartily indorsing your recommendation to the Rivers and Harbors Committee that the Allegheny River be slackwatered as far as Mahoning, about 50 miles from its mouth.

This improvement of the river is within the industrial center of the United States and will make available a magnificent waterway, at present only a small proportion fit for navigation, for the transportation of the varied and unlimited natural resources of the richest section of western Pennsylvania. It will give local transportation

Digitized by Google

between the cities and towns that line its banks and will open up new fields of industry.

The members of this association, composed of progressive citizens of the valley from Pittsburgh to Oil City, are enthusiastic over the culmination of their earnest desires and long effort and trust that nothing will prevent its successful issue.

Respectfully, yours,

ALLEGHENY RIVER IMPROVEMENT ASSOCIATION,
By EDWARD W. DEWEY, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF MR. EDWARD W. DEWEY.

BRADYS BEND, PA., *January 5, 1912.*

DEAR SIR: It is with great pleasure and satisfaction that the residents along the Allegheny River learned of your recommendation to the Rivers and Harbors Committee that the river be slackwatered as far as Mahoning, though some of us would like to see it reach us further up. However, we are delighted that there is a prospect of its coming in our direction.

From my property we are shipping 3,000 tons of coal and 700 tons of limestone daily by rail; the drift of the vein is toward the river and we could better ship by water. The Pittsburgh Limestone Co. has a lease on part of my property and is planning for a daily output of 4,000 to 5,000 tons daily, for furnace use and for Portland cement. The vein is about 16 feet thick and it is mined like coal. Our clays make the best brick for building and furnace use, which is shipped entirely by rail. There is a quantity of iron ore remaining on my property, formerly used by the Bradys Bend Iron Co., that runs 35 to 45 per cent metallic iron, that is being investigated with a view of again using the native ores. What applies to my property can be said of many other sections of the valley, and all we need is water transportation to take our minerals to market.

Yours, truly, EDWARD W. DEWEY.

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF MR. JOHN H. JONES.

PITTSBURG-BUFFALO CO.,
Pittsburgh, Pa., January 6, 1912.

DEAR SIR: I urge upon you the necessity of the building of additional dams on the Allegheny River.

At our Johnetta plant, 34 miles from Pittsburgh, we have over 4,000 acres of Freeport and Kittanning coal lands. We have a brick plant located on this property from which we ship between 15,000,000 and 20,000,000 brick annually. We also ship 100,000 tons of coal annually from our mine at this point to various places via the Pennsylvania Railroad.

The 2,000 acres of Freeport and 2,000 acres of Kittanning coal lands which we own contain about 15,000,000 tons of coal.

If we had slackwater to our plant, it would be possible for us to transport the 15,000,000 tons of coal contained in this property for 30 cents per ton less than what we are now paying to the railroad company, or, in other words, if we had slackwater on the Allegheny River, instead of taking out 100,000 tons of coal annually, which we are now doing, it would be possible for us to take out many times this amount, as we will be able to market it to better advantage.

The coal lands in the Allegheny Valley are very extensive, and the coal will in the future be shipped very extensively to all parts of the United States. At the present time there are several million tons of these coals being shipped via rail by the Buffalo, Rochester & Pittsburgh Coal Co., the Shawmut Coal Co., and many other companies to Canada, New York State, and adjacent territory.

These coal lands along the Allegheny River have not been developed extensively, owing to the fact that they are unable to get this coal into the market at the same rates as other coals of similar quality.

Digitized by Google

The natural way of shipping this coal would be to load it in barges and distribute it to the different steel plants along the Allegheny River as well as on the Ohio and Monongahela Rivers.

It is true that the coal on the Allegheny River is not equal to the coal on the Monongahela River for all purposes, but it is also true that it is one of the best steam coals mined.

If additional dams are built on the Allegheny River, which would result in these coal fields being tapped, it will only be a few years until the commerce of the Allegheny River will exceed that of the Monongahela. I make this statement, knowing the condition on both rivers.

It will possibly surprise you to learn that there is more coal above water level on the Allegheny River, which could be shipped by water, providing a stage of water could be maintained the year round, than there is above water level on the Monongahela River, so that you can see the necessity of urging the early completion of the dams necessary to float coal on the Allegheny River.

With kindest regards, and wishing you the compliments of the season, I am,

Very respectfully, yours,

JOHN H. JONES.

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF KITTANNING BRICK & FIRE CLAY CO.

KITTANNING BRICK & FIRE CLAY CO.,
Pittsburgh, Pa., January 6, 1912.

DEAR SIR: In regard to the proposed construction of additional locks and dams for slack-water navigation in connection with the Allegheny River, in order that this company could avail itself of water transportation from its brick factories and clay mines located 2 miles north of Kittanning, Pa.:

The slack-water would have to extend to a point known as "Moss Grove," some few miles above Kittanning. This, we believe, would place our factory within what would be known as the "Seventh Pool."

To give you some idea as to the tonnage we could move by water were these improvements to be made, we take pleasure in supplying the following from our past year's records:

This company owns and operates two brick factories, as above stated, near Kittanning, Pa., with a daily tonnage in burned brick amounting to about 800 tons. We have available for shipment, if water transportation was within reach, a 4-foot vein of coal underlying 550 acres of land, also a 10-foot vein of the very best grade of plastic fire clay underlying about 350 to 400 acres of land, also a very large quantity of sandstone suitable for building purposes.

In addition to our outbound tonnage would be a large quantity of sand, straw, lime, etc., inbound. If suitable navigation facilities were provided we venture to say the tonnage from the Allegheny Valley would be increased at least threefold.

This company strongly recommends the movement to extend slack-water and improve the condition of the Allegheny River so that water transportation may be within reach of the extensive mineral deposits which, with the exception of coal are much more varied and valuable than those found in the Monongahela Valley.

Yours, very truly,

KITTANNING BRICK & FIRE CLAY CO.,
S. C. MARTIN, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF DAUGHERTY BROS. BRICK CO.

DAUGHERTY BROS. BRICK CO.,
Kittanning, Pa., January 6, 1912.

DEAR SIR: In compliance with a request of your department we are giving you an exact statement of our shipments for 1911:

Tons shipped out	708
Tons shipped in	760
Total	1,468

Digitized by Google

Our shipments were very small last year, for the reason that our home trade took almost our en ire output. We make only common building brick and the present high freight rate prevents us from getting into the city market.

We are shipping brick at the present with a haul of not over 40 miles that costs [illegible] cents per ton freight; that means $2.40 per 1,000 freight, almost half the value of the brick, as we are loading them on cars at $6 per 1,000.

To give you an idea of the opinion in general of manufacturers all over the country on inland navigation, we quote from one of our trade journals published in Indianapolis.

"THE SOLUTION OF THE FREIGHT-RATE PROBLEM.

"More people than ever before are now realizing the importance of inland navigation as a solution of the freight-rate problem and also of moving merchandise and serving the country properly. In fact, it is beginning to look as if, before we get the Panama Canal finished and some of our main rivers improved, there will be many other canal projects underway, and eventually we will realize that the highways of commerce, with navigable water, is more to be desired than some of the great roadway projects for automobiles that are being talked of."

Respectfully, yours,

DAUGHERTY BROS. BRICK CO.,
WM. B. DAUGHERTY, *President*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF KITTANNING IRON & STEEL MANUFACTURING CO.

KITTANNING IRON & STEEL MANUFACTURING CO.,
Kittanning, Pa., January 6, 1912

DEAR SIR: Referring to visit of Mr. Ashcroft and to your letter of December [illegible] beg to advise we have a blast furnace and rolling mill on the banks of the Allegheny River here at Kittanning.

The capacity of the furnace is 100,000 tons of pig metal and the rolling mill [illegible] tons muck bar annually. The amount of ore required would be 200,000 tons which we receive by rail from the lower lake ports, 100,000 tons coke which we get from the Connellsville region, and 60,000 tons limestone which we get along the Allegheny River.

Your second question, as to the amount of freight we might receive and ship in the event of slack-water extension. If the Erie Canal was through to Pittsburgh we could receive all of our ore from the lakes by water, about 200,000 tons annually, and if the river was slack-watered we could receive the limestone, 60,000 tons, and the coke might be gotten from along the river when it too could be received by water, about 100,000 tons annually.

Referring to the third question, as to the upstream limit of the improvement required to accommodate our traffic, we think we might be able to use the river from the mouth of Red Bank Creek down.

We are very much in favor of this project, as the hills abutting on the river hold large quantities of minerals, such as coal, ore, limestone, fire clay, stone for building and curbing, etc., that could be handled advantageously by water and at a freight rate that might cause something to be done with them.

Yours, truly,

KITTANNING IRON & STEEL MANUFACTURING CO.,
H. A. COLWELL, *Superintendent.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF PITTSBURGH PLATE GLASS CO.

PITTSBURGH PLATE GLASS CO.,
Pittsburgh, Pa., January 8, 1912.

DEAR SIR: Replying to your circular letter of December 30, 1911, requesting information intended to show the benefits which may be derived from the improvement of the Allegheny River, we take pleasure in submitting the following, which, wherever possible, is based upon actual figures, but of necessity some figures must be estimated:

Digitized by Google

These estimates have been prepared with care, and we believe them to fairly represent the tonnage which will be available as set forth. As a mere basis for our statements, we call your attention to the following operations of the company at the locations mentioned:

Plate-glass factory, works No. 1, Creighton, Allegheny County, Pa.
Plate-glass factory, works No. 2, Tarentum, Allegheny County, Pa.
Coal mine, Creighton, Allegheny County, Pa.
Plate-glass factories, works Nos. 4 and 5, Ford City, Armstrong County, Pa.
Coal mine, Mosgrove, Armstrong County, Pa.
Undeveloped limestone property, Rimerton, Armstrong County, Pa.
Melting and grinding sand quarry, Kennerdell, Venango County, Pa.
All of which operations are upon the Allegheny River.

We will endeavor to answer your questions in the order mentioned in your letter.

(*a*) Our annual receipts and shipments for the year 1911 are as follows:

	Tons.
Outbound rail tonnage	48,148
Inbound rail tonnage	414,680
Inbound river tonnage	88,000
Inbound private tramways, etc	135,000
Total inbound and outbound tonnage, 1911	685,828

However, to view this proposition from probable conditions a few years hence, the above figures would be altered somewhat, as follows:

	Tons.
Additional tonnage, inbound, resulting from changes and enlargements now contemplated (estimated)	150,000
The substitution of coal for gas now produced and used (estimated)	125,000
Increased outbound tonnage	10,000
Estimated approximate total under revised conditions	970,828

As a word of explanation relative to the last two items, will state that this company contemplates increasing the capacity of its works No. 4, at Ford City, which increased capacity will consume raw materials in addition to those first mentioned to the extent of 150,000 tons per annum, as above set forth.

Your attention is also called to the fact that at the present time this company owns and operates its own natural gas department. The natural gas which this company receives through its lines is equivalent in heat value to 125,000 tons of coal per annum. In view of the fact that the gas fields in western Pennsylvania are waning, and in view of the fact that this company can not afford to use natural gas when its cost is equivalent to producer gas cost, it is only a question of a short time before coal will of necessity be substituted for natural gas now used, thereby increasing the tonnage as set forth.

(*b*) Of the present tonnage above mentioned, 685,828 tons, with slack water provided as far as Franklin, Pa., we estimate that 580,000 tons would be shipped and received by water movement.

Of the prospective tonnage above named, 970,828 tons, with slack water provided as far as Franklin, Pa., we estimate that 800,000 tons would be shipped and received by water movement per annum.

(*c*) The maximum benefits to be derived from river improvement, as viewed from this company's position, could not be enjoyed unless the river were improved up to, or nearly to, Franklin, Pa., a distance of 115 to 125 miles above the mouth of the river, thereby enabling the company to utilize river movement for its grinding and melting sand produced at its quarry at Kennerdell, which is located 108 miles above the mouth of the river. However, very marked and acceptable benefits would accrue to this company were the river to be improved (as suggested in your letter) for a distance of 61 miles from the mouth of the river. Such an improvement would enable the company to transport its coal used at its Ford City works from its mine located at Mosgrove, Pa. At practically all the points mentioned the company has riparian rights, and is in a position to enjoy the benefits of navigation as soon as same are available.

The coal above referred to to-day is moved by rail, and in the aggregate amounts—under present manufacturing conditions—to approximately 150,000 tons a year. This could be immediately diverted to water movement. In fact, the proposed improvement for a distance of 61 miles, in our opinion, would enable this company to enjoy within 75,000 to 100,000 tons of maximum river tonnage, viewed from the present necessities, making the available tonnage for river movement 480,000 to 505,000 tons.

(*d*) The figures and estimates shown herein refer only to the tonnage of this company in connection with its glassworks. Should slack water be available at both of

Digitized by Google

its coal mines upon the Allegheny River, it is not at all improbable that coal will be mined and shipped to others from such mines, in which event such tonnage will be additional to the figures herein given. We think a conservative estimate of tonnage of that character after a reasonable period of development would range at least from 100,000 to 200,000 tons a year.

In conclusion, to sum up the situation, would state that we estimate the possible tonnage which may be handled by river movement in the near future from our operations, provided slackwater is extended to Kennerdell or Franklin, as 1,000,000 tons with a shrinkage of perhaps 75,000 to 100,000 tons, were the improvement only to extend for a distance of 61 miles, as recommended by you.

Should you desire any further analysis of this subject, or additional facts, we would be very glad to supply them to you to the best of our ability.

Yours, very truly,

W. L. CLAUSE, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF KITTANNING CLAY PRODUCTS CO.

KITTANNING CLAY PRODUCTS CO.,
Bradford, Pa., January 9, 1912

DEAR SIR: In reply to your letter of the 6th instant, will say that we are very greatly interested in the proposed slack-water improvement on the Allegheny River and have always been of the opinion this would be accomplished in due time. At the time we built our works at Cowanshannoc we located the plant with the thought of slack-water improvement in mind.

Having visited our plant, you, no doubt, noticed how well located we are for such shipments. I believe that we could develop quite a heavy tonnage from our factory for delivery at Pittsburgh and other river cities down the Ohio. It certainly would be a great improvement over the present railway facilities.

We are manufacturing at the present time about ten million brick per year, and our shipments amount to about nine million on the average. This would be, on an average, about 27,000 tons. Trusting you may be successful in securing these improvements and assuring you of our assistance and hearty cooperation, we beg to remain

Very truly, yours,

KITTANNING CLAY PRODUCTS CO.,
C. E. FOSTER, *General Manager.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

LETTER OF BEN FRANKLIN COAL CO.

BEN FRANKLIN COAL CO.,
Freeport, Pa., January 9, 1912.

DEAR SIR: In answer to your letter of the 8th instant, with regard to improvement of the Allegheny River, would state that our present shipments by rail amount to 70,000 tons. We have recently acquired a large additional coal acreage, extending from Edgecliff to above Metcalf Station, about 2½ miles of river frontage, and it is our intention in addition to our present mines shipping by rail to open new mines to ship by river in the event of slack-water extension, we feel certain that we can develop a large coal tonnage to ship by water for the reason that river shipment would open up to us a market that we can not now reach by rail, and this would not necessarily decrease our rail shipments.

One more dam placed near Natrona would accommodate our river traffic, and we sincerely hope that this work will be commenced in the near future and continued until completed.

Yours, very truly,

BEN FRANKLIN COAL CO.,
M. J. MCQUADE.

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

Digitized by Google

LETTER OF ALADDIN COAL & COKE CO.

ALADDIN COAL & COKE CO.,
Leechburg, Pa., January 9, 1912.

MY DEAR SIR: Your valued letter of inquiry of December 30 to hand. In reply would state that our present works have a capacity of about 1,000 tons per day. We have river front, and if we had water transportation could increase very largely, as we are very much hampered for want of railroad competition.

We are situated just above the mouth of the Kiskiminetas River on the Allegheny River. We have several thousand acres of coal and could increase our output almost indefinitely if we had water transportation. We can not compete with those who have it.

Very respectfully, yours,

ALADDIN COAL & COKE CO.,
JOS. G. BEALE, *President.*

Lieut. Col. H. C. NEWCOMER,
Corps of Engineers.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 546.

CHANNEL FROM CORE SOUND TO NEWPORT RIVER, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF CHANNEL FROM CORE SOUND TO NEWPORT RIVER, BY WAY OF TAYLORS CREEK OR CARROT ISLAND SLOUGH, N. C., WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT.

FEBRUARY 17, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 17, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 15th instant, together with copies of reports from Capt. (now Maj.) Earl I. Brown, Corps of Engineers, dated December 19, 1910, and April 28, 1911, with map, on preliminary examination and survey, respectively, of channel from Core Sound to Newport River, N. C., by way of Taylors Creek or Carrot Island Slough, made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 15, 1912.

SIR: I have the honor to submit herewith for transmission to Congress reports dated December 19, 1910, and April 28, 1911, with map, by Capt. (now Maj.) Earl I. Brown, Corps of Engineers, on preliminary examination and survey, respectively, of channel from Core

Digitized by Google

Sound to Newport River, N. C., by way of Taylors Creek or Carrot Island Slough, prepared in compliance with the river and harbor act approved June 25, 1910.

The improvement desired at this locality is a protected route from Core Sound to Beaufort and vicinity for the accommodation of small vessels engaged in general commerce which can not safely navigate the exposed channel in front of Beaufort Inlet.

The district officer presents, with favorable recommendation, a plan for such a channel 5 feet deep at mean low water and 40 feet wide on the bottom, by way of Taylors Creek at an estimated cost of $30,000 for first construction and $2,000 annually for maintenance.

For the reasons given in his report the division engineer does not concur in this recommendation.

These reports have been referred as required by law to the Board of Engineers for Rivers and Harbors, to whose report dated February 5, 1912, herewith, attention is invited. The board has visited the locality, held a public hearing there, and discussed the improvement with interested persons, as a result of which the locality to be benefited offers to contribute one-third of the cost of the improvement. In the opinion of the board the commercial and navigation interests involved are of sufficient magnitude to justify the United States in undertaking the proposed improvement on the basis of two-thirds of the cost being borne by the United States and the balance by the locality.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress I report as follows: That the improvement by the United States of the channel from Core Sound to Newport River, N. C., by way of Taylors Creek is deemed advisable so far as to secure an available mean low-water depth of 5 feet and a bottom width of 40 feet, following in general the methods described in the report of the district officer, at an estimated cost of $30,000 for first construction and $2,000 annually for maintenance, provided the work shall not be undertaken until local interests have contributed the sum of $10,000 therefor, as recommended by the board. It is recommended that the initial appropriation by the United States be in the sum of $20,000 in order that the entire work of construction may be undertaken and prosecuted to an immediate completion.

Very respectfully,

W. H. Bixby,
Chief of Engineers, U. S. Army.

The Secretary of War.

PRELIMINARY EXAMINATION OF CHANNEL FROM CORE SOUND TO NEWPORT RIVER, N. C.

United States Engineer Office,
Wilmington, N. C., December 19, 1910.

Sir: I have the honor to submit the following report of a preliminary examination made by me of a channel from Core Sound to Newport River, N. C., pursuant to the following provision of the river and harbor act approved June 25, 1910: "Channel from Core Sound to Newport River, by way of Taylors Creek or Carrot Island Slough."

Digitized by Google

There will be found printed in House Document No. 210, Fifty-eighth Congress, second session, report of Capt. E. W. Van C. Lucas, Corps of Engineers, and his successor, Capt. E. Eveleth Winslow, Corps of Engineers, on an examination of Carrot Island Slough and Lewis Thoroughfare, made in compliance with the provisions of the river and harbor act of June 13, 1902.

Relative to Carrot Island Slough, these officers reported that its improvement was desired to afford passage for small boats in their frequent trips from Gore Sound to Beaufort Harbor and vicinity, in order to avoid the rough and sometimes dangerous crossing of Beaufort Inlet, which it is now necessary to make to reach Beaufort or Morehead City. The commerce between Core Sound points and these two cities was reported to be about 50,000 tons annually, all transported in small sailing vessels or launches. Estimates of cost of work and amount of dredging required to obtain depths of 7, 8, 9, and 10 feet were given, and the statement made that Carrot Island Slough would be very expensive, if not impossible, to maintain on account of cross currents passing at high water over the barrier reef, Bird Shoal, separating it from the main channel, and of the shifting character of the sand bottom. An alternative route through Taylors Creek to the north of Carrot Island was suggested as likely to afford a more permanent improvement, although somewhat more expensive in first cost.

It was reported further that upon a comparison of the cost of improving the locality to the different extents considered and the value of the commerce to be benefited, the expenditure was not then justifiable, although it was suggested that the commercial value of the community might increase to such an extent as to justify the improvement should Beaufort Inlet become the actual terminus of the proposed inland waterway.

Beaufort Inlet having now become the actual terminus of an inland waterway connecting with northern points, and the country bordering Core Sound having greatly increased in wealth and population, the people of the community again desire that their need for better and safer communication with Beaufort be considered.

The southern shore of Core Sound, stretching eastward from Beaufort for nearly 40 miles, is entirely dependent upon water transportation, Beaufort being the nearest railroad station.

It is stated that there are about 6,000 inhabitants in this section, all of whom are more or less dependent upon Beaufort and Morehead City as trading points. Their trade is carried on through about 50 local stores, which do a business of $5,000 to $10,000 each annually.

The annual commerce reported from Beaufort Harbor, most of which comes from Core Sound points, is 45,000 to 50,000 tons per annum, valued at about $2,000,000. On account of the fact that nearly every merchant, fisherman, and farmer owns and operates his own boat, it is almost impossible to obtain any accurate commercial statistics. It is known, however, that there are not less than 500 small gasoline boats operated on these waters. The boats have two routes for reaching Beaufort or Morehead City: One is to follow the main channel, which carries them across the mouth of the wide, exposed inlet, which the prevailing southwest winds make too rough for small open boats constructed for use on the smooth sounds; the other route is through Carrot Island Slough, which is now practicable

Digitized by Google

only at high water. As much of the produce brought in by the boats is of a perishable nature, as fish, clams, oysters, and garden truck, the delay of a tide is sometimes fatal to the cargo, especially when it cannot be saved by coming via the inlet when it is rough. Frequently in attempting to pass the inlet any way boats and cargoes are lost or badly damaged. Boats of sufficient size to pass the inlet safely are not constructed for several reasons. The owners are not wealthy enough to have large boats, the sound waters are too shallow to permit deep-draft boats to run, and the shallow shores on the sound do not permit landing with deep-draft boats except by excessively long wharves.

The fish scrap business on the sound is quite large. There are five fisheries making scrap and oil from the menhaden. There are said to be 250,000,000 feet of uncut timber in this section, with two or three sawmills in operation; also an oyster cannery and a clam cannery.

For reasons clearly set forth in the previous report on Carrot Island Slough, I do not believe it to be worthy of improvement by the General Government, but I believe that a small channel through Taylors Creek would be of great value to these small boats, and recommend that I be authorized to prepare plans and estimates of cost for a channel from Core Sound to Newport River via Taylors Creek, which can be done, from information now at hand, without any further survey.

Nearly all the various settlements along the sound are provided with landing facilities, and there are ample wharves at Beaufort. No further increase in wharfage and terminal facilities in this connection are therefore deemed necessary.

There are no questions of water power or other related subjects to be considered in connection with this improvement.

Respectfully submitted.

EARL I. BROWN,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., December 21, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army.

As the question of the worthiness of Taylors Creek is largely one of cost, it is recommended that the district officer be authorized to prepare plans and estimates of cost of a channel from Core Sound to Newport River, via Taylors Creek, and to submit the same for consideration.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

Digitized by Google

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 9, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The object of this preliminary examination of the channel from Core Sound to Newport River, by way of Taylors Creek or Carrot Island Slough, is to provide a protected route from Core Sound to Beaufort and vicinity for the use of the many small vessels contributing to the general commerce of this locality. At high tide such vessels can now pass through Carrot Island Slough, but as the commerce consists in large part of perishable produce, fish, oysters, etc., these boats can not be held for favorable tides without injury to their cargoes, nor can they safely navigate the exposed channel in front of Beaufort Inlet.

A preliminary examination and survey of this route was made in 1902 and 1903, respectively, and the locality was not then regarded as worthy of the expenditure necessary to provide the desired facilities. Since that time, however, a project has been adopted for an inland waterway from Pamlico Sound to Beaufort Inlet, both Beaufort and Morehead City have increased in commercial importance, and there has been a general increase in wealth and population in the surrounding country.

In view of these facts, the board concurs in recommending that a plan and estimate for improvement via Taylors Creek be authorized, believing with the division engineer, that the question of the worthiness of the improvement is largely one of cost, which must be determined before an opinion as to the advisability of the work can be rendered.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 17, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of channel from Core Sound to Newport River, N. C., by way of Taylors Creek or Carrot Island Slough, authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, i. e., by way of Taylors Creek, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT,
January 18, 1911.

Approved.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

Digitized by Google

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF CHANNEL FROM CORE SOUND TO NEWPORT RIVER, N. C.

UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., April 28, 1911.

SIR: In compliance with instructions contained in department letter dated January 21, 1911, I have the honor to submit the following report of plans and estimates for a channel from Core Sound to Newport River by way of Taylors Creek.

A reference to Coast Chart No. 420 of the United States Coast and Geodetic Survey will show that Taylors Creek is a narrow, shallow body of water extending along the north shore of Core Sound from Lenoxville Point to the town of Beaufort, and separated from Core Sound by Carrot Island Marshes.

The necessity for an improvement of this small stream, or properly slue, lies in the fact that Beaufort is the county seat and principal town of Carteret County, and is the nearest railroad point and port for practically all the eastern portion of the county, especially that prosperous section bordering on Core Sound, which, excluding the town of Beaufort, has a population of 5,105 and does a business with Beaufort amounting to more than $1,227,340 annually.

A preliminary examination and survey of a route for this traffic was made in 1902 and 1903, printed in House Document 210, Fifty-eighth Congress, second session, in which estimates were given for a channel through Carrot Island Slough to Newport River, for depths of 7, 8, 9, and 10 feet, with a channel of 80 feet in width, the estimated costs being $54,105, $74,145, $96,345, and $123,645, respectively.

Since, however, the object of the present examination is to provide a protected route from Core Sound to Beaufort for the use of the many small boats used on these waters, and not for the large seaworthy vessels that may use the more exposed route to Beaufort down the main channel of the Sound to the inlet and thence to Beaufort via Bulkhead Channel, a depth of 5 feet at mean low water, and having a bottom width of 40 feet, has been deemed sufficient to accommodate this traffic, and the estimates have been prepared accordingly.

There is forwarded herewith a copy of the map showing the results of the survey of 1903, which is the basis on which these estimates have been prepared. The proposed route through Taylors Creek is shown thereon. The total distance from the 5-foot contour in Core Sound, near Lenoxville Point, at the mouth of North River Thoroughfare to a 5-foot depth in Beaufort Harbor, is 13,500 feet, and the depth of water along the route does not generally exceed 1 foot at mean low water, parts of it being bare at that stage. From the town of Beaufort Newport River can be reached by two channels having 7 and 10 feet of water, respectively, which have already been provided for and to which no further consideration need be given in this connection.

The cost of the proposed work will be as follows:

For dredging 180,000 cubic yards of mud, sand, and shells from a cut 40 feet wide and 5 feet deep at mean low water, at $0.15 per cubic yard	$27,000
Engineering and contingencies	3,000
Total cost	30,000
Annual cost of maintenance	2,000

When the preliminary examination of 1902–3 was made it was reported that the total value of the commerce of Beaufort Harbor for the year 1902 was valued at $400,000, of which about two-thirds

Digitized by Google

'ORT RIVER CHANNEL
D. 546 ; 62d Cong., 2d Sess.

Digitized by Google

PLAN AND ESTIMATE OF COST O
CORE SOUND TO N

UNITE

SIR: In compliance with inf
letter dated January 21, 1911, I
ing report of plans and estimat
Newport River by way of Taylo
A reference to Coast Chart N
Geodetic Survey will show tha
body of water extending along
Lenoxville Point to the town
Sound by Carrot Island Marsh.
The necessity for an improv
slue, lies in the fact that Bea
town of Carteret County, and
for practically all the eastern
prosperous section bordering
town of Beaufort, has a popu
Beaufort amounting to more
A preliminary examination
was made in 1902 and 1903,
eighth Congress, second sessi
channel through Carrot Isla
of 7, 8, 9, and 10 feet, with a
costs being $54,105, $74,145
Since, however, the object
a protected route from Core
small boats used on these
vessels that may use the m
main channel of the Sound
Bulkhead Channel, a depth
a bottom width of 40 feet, b
this traffic, and the estima
There is forwarded herev
of the survey of 1903, which
been prepared. The prop
thereon. The total distar
near Lenoxville Point, at
a 5-foot depth in Beaufor
water along the route do
water, parts of it being b
fort Newport River can b
feet of water, respectively
to which no further consi
The cost of the propos

For dredging 180,000 cubic ya
wide and 5 feet deep at mea
Engineering and contingencie

Total cost.....
Annual cost of maintenance.

When the preliminar
reported that the total
the year 1902 was val

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

would be affected by the proposed improvement. From the table given below for the year 1909 it will be seen that the traffic between Beaufort and Core Sound Points is now nearly four times as great as then, and it is believed that the proposed improvement will develop more.

Commerce handled over waterway from Core Sound to Newport River via Carrot Island Slough or Taylors Creek, for the year ending Dec. 31, 1909.

Article.	Unit.	Westbound.		Eastbound.	
		Amount.	Valuation.	Amount.	Valuation.
Cotton	Bales	100	$7,000		
Fertilizers	Tons	1,217	26,774		
Canned oysters and clams	do	358	35,800		
Drygoods	do			495	$99,000
Groceries	do			4,962	697,480
Hardware	do			1,011	101,100
Fish oil	Barrels	1,819	45,475		
Potatoes	Bushels	34,200	20,520		
Clams	do	22,540	22,540		
Oysters	do	40,750	40,750		
Wood	Cords	500	1,500		
Gasoline and kerosene	Barrels			2,822	14,110
Salt	Sacks			1,690	676
Soft crabs	Tons	46	23,000		
Fish	Boxes	12,945	90,615		
Terrapins	Number	1,000	1,000		
Total			314,974		912,366

SUMMARY.

Total value of commerce, westbound	$314,974
Total value of commerce, eastbound	912,366
Total	1,227,340

In view of the commercial importance of this line of trade and of the great danger to the small boats necessarily used in the trade in passing by the exposed inlet, I am of the opinion that the work proposed herein is worthy of being undertaken by the Government, and recommend the appropriation of the sum of $30,000 in one lump sum for same, so that when begun all work can be completed without waiting for further appropriations.

As the locality is simply part of a proposed through route there will be no necessity for wharves and terminal facilities, and none now exist.

There are no questions of water power, flood control, or other related subjects to be considered in connection with the proposed improvement.

Respectfully submitted.

EARL I. BROWN,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., May 1, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

The quantity of commerce handled in and out of Beaufort seems quite large. The value, also, is large, although it seems to me that

Digitized by Google

in case of some of the commodities, at least, it is somewhat inflated. However, I do not think that this entire commerce would be benefited by the proposed improvement.

The improvement is nothing but a small dredged channel, 5 feet deep and 40 feet wide. This would be available for the very small class of boats, but the larger ones, which must carry the larger part of the commerce, and the fishing boats, which must be designed to go to sea, would certainly take the old route. The exposure is not greater than in St. Andrews Sound, St. Simons Sound, Sapelo Sound, or St. Catherines Sound, and business is done across all of these.

If it were the case of commerce coming out of a long, shallow, fresh-water river, where stern-wheel boats had to be used, it would be different, but this commerce is carried on by salt-water boats, which, if they are not seaworthy, could readily be replaced by a class of boats that are.

I am of the opinion that the improvement is not worthy of being undertaken by the General Government.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 5, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The district officer presents herein an estimate in the sum of $30,000 for a channel 5 feet in depth at mean low water and 40 feet bottom width through Taylors Creek connecting Core Sound with Beaufort Harbor. Maintenance is estimated at $2,000 annually. He believes the commercial interests involved are sufficient to justify this expenditure and he recommends the adoption of the project. For reasons given the division engineer does not concur in these views.

On November 7, the board visited the locality, held a public hearing and discussed the question of this improvement with a number of interested persons. It appears from data furnished the board that there are about 1,000 small boats which traverse these waters, all being more or less concerned in the proposed improvement. These vessels are engaged in fishing, oystering, lumbering, trucking, and transporting farm products and general merchandise, and have either to use this waterway, which is only about 1 foot in depth at low water or go by way of the exposed inlet. There is no doubt that these vessels must either incur danger at the inlet or wait for a convenient tide to navigate the inland route. This, of course, is objectionable, particularly when the vessels are loaded with perishable freight. It appears that the country adjacent to Core Sound is developing and that the amount of commerce now tributary to this route should increase in the future.

From statements made at the hearing it appeared that the local interests might be willing to cooperate to the extent of furnishing a part of the cost of the work desired. The board requested further consideration of this matter, resulting in the accompanying certified communication by Alphonse T. Gardener, mayor of Beaufort, N C., and

Digitized by Google

copy of an ordinance and certain resolutions indicating a willingness on the part of the community to contribute an amount equal to one-third the cost of the proposed work.

In view of all the circumstances, the board has arrived at the conclusion that commercial and navigation interests involved are of sufficient magnitude and importance to justify the United States in undertaking the improvement proposed on the basis of two-thirds of of the cost being paid by the United States and the balance by the locality. It is therefore recommended that the project be adopted subject to the proviso that work shall not be undertaken until the locality has contributed the sum of $10,000 to be used in the execution of the work. The balance of $20,000 should be made available in one appropriation, and about $2,000 annually thereafter for maintenance.

In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects except as to cooperation outlined above which could be so coordinated with the proposed improvement as to lesson the cost and compensate the Government for expenditures made in the interests of commerce and navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

LETTER OF MR. J. F. DUNCAN.

BEAUFORT, N. C., *December 18, 1911.*

SIRS: Re Taylors Creek, Carteret County, N. C., proposed improvement: Referring to matter above, and especially relative to disposition of local interests in regard to a fair contribution toward the expense of securing same, I beg, consequent to a meeting of the citizens of Beaufort Township, to transmit to you herewith certain data assuring the contribution by said local interests of a sum equal to one-third of the total cost of the improvement proposed.

This data has been prepared and formulated, subsequent to suggestion of Capt. L. H. Rand, Corps Engineers, United States Army, consequent to your direction to him; and upon his further suggestion, in a letter dated December 4, 1911, same is being transmitted direct to you.

In this connection is inclosed certified copy of the ordinance passed by the Board of Commissioners of Beaufort, N. C., and copy of a resolution and agreement circulated in Beaufort Township, by an officer thereof, and carrying the signatures of more than 50 per cent of the qualified voters therein. Every business man has signed; and of the 389 voters to whom it has been presented (the idea being only to secure a safe majority for the measure) only 20 declined to sign. The measure has met the unqualified indorsement of every citizen of influence and public spirit to whom it has been presented.

If there be further data desired, we shall be glad to receive and act upon your further suggestions.

Yours, very truly,

J. F. DUNCAN,
In behalf of citizens Beaufort Township.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Data relative to proposed improvement of Taylors Creek furnished by the mayor of Beaufort, N. C.]

CERTIFIED STATEMENT BY THE MAYOR OF BEAUFORT, N. C.

NORTH CAROLINA, *Carteret County:*

I, Alonzo T. Gardner, mayor of the town of Beaufort, N. C., do hereby certify that according to the official books of poll there are 706 voters in the Beaufort Township; that I have compared the original resolution, or ordinance, passed by the

Digitized by Google

Board of Commissioners of the Town of Beaufort with the copy which is hereto attached, and have also compared the original resolution and agreement which was circulated by Officer J. H. Skarren and signed by the said voters whose names appear thereto attached with the copy which as hereto attached, and I do certify that the said copies annexed are true and perfect copies, as same are contained on nine (9) sheets attached hereto, from the original of said ordinance and said resolution and agreement.

Dated this December 18, 1911.

[SEAL.]

ALONZO T. GARDNER,
Mayor of Beaufort, N. C.

Certified before me, this December 18, 1911.

[L. S.]

J. F. DUNCAN,
Notary Public.

My commission expires the 4th day of May, 1913.

CERTIFIED STATEMENT BY MR. J. H. SKARREN.

NORTH CAROLINA, *Carteret County:*

I, J. H. Skarren, constable of Beaufort Township, do hereby certify that the attached list of names, as contained in the seven (7) pages attached in connection with the resolution and agreement immediately preceding same and forming part thereof, is a correct copy from the original list as same has been secured by me in carrying same around among the voters of said township of Beaufort; and I do further certify that the said names, as signed to said agreement, were signed bona fide by the voters thereon represented, with full information as to the project therein proposed.

This December 18, 1911.

J. H. SKARREN,
Constable, Beaufort Township

Certified before me, December 18, 1911.

[L. S.]

J. F. DUNCAN,
Notary Public

My commission expires the 4th day of May, 1913.

ORDINANCE AS SAME WAS PASSED BY THE BOARD OF COMMISSIONERS OF THE TOWN OF BEAUFORT IN MEETING ASSEMBLED ON THE 4TH DAY OF DECEMBER, 1911.

Whereas it is necessary and urgent for the development of this community and for the convenience of the citizens that a channel be dredged from Lennoxville to Beaufort, through Taylors Creek;

And whereas the said channel if constructed would be of especial benefit to the whole of Beaufort Township: Now, therefore,

Be it resolved, That the mayor appoint a committee to petition the next legislature to enact a law submitting to the people of Beaufort Township the issuance of the bonds of said township in an amount equal to one-half the amount to be appropriated by the United States Government for the purpose of constructing said channel.

RESOLUTION AND AGREEMENT BY THE CITIZENS OF BEAUFORT TOWNSHIP, N. C.

Whereas at a meeting of the citizens of Beaufort Township held on the 4th day of December, 1911, at the town hall in the town of Beaufort, a resolution was adopted asking that the question of an issue of bonds by the said township to an amount not exceeding one-half of such amount as shall be appropriated by the United States Government for the purpose of constructing and dredging a channel of 5-foot depth through Taylors Creek in Carteret County, N. C., be submitted to the voters of said township, for their rejection or approval;

---

[1] Only 3 names out of the 369 are printed.

Digitized by Google

And whereas at said meeting an ordinance was proposed and accepted by said meeting, to be presented to the board of aldermen of the town of Beaufort, said ordinance authorizing the mayor of the town of Beaufort to appoint a committee to petition the legislature to pass an act submitting the question of the said issuance of Beaufort Township bonds in the amount as aforesaid to the voters of said township;

And whereas the aldermen of said town of Beaufort, in regular meeting assembled on the 4th day of December, 1911, did pass the ordinance as proposed by said citizens' meeting;

And whereas said citizens' meeting did further appoint a committee of three to present this matter to the board of county commissioners of Carteret;

Now, therefore, we, the undersigned business men and citizens and voters in the township of Beaufort, recognizing the importance of this proposed development and appreciating the beneficial results that will accrue to said township therefrom,

Do hereby indorse our approval of the proposition to issue the bonds of said Beaufort Township in an amount not exceeding one-half of the amount to be appropriated by the United States Government, for the purpose of constructing a 5-foot channel through Taylors Creek, connecting Beaufort and the east by inland passage; and do hereby pledge our full and unqualified support to this movement, and hereby pledge our vote for the issuance of the bonds for this purpose, as is herein proposed.

THOS. THOMAS,
BEN. MAY,
D. M. JONES, AND 366 OTHERS.[1]

---

[1] Only 20 persons to whom this paper was presented either failed or refused to sign.

O

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 549.

NIAGARA RIVER, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF NIAGARA RIVER, N. Y., WITH A VIEW TO SECURING A DEPTH OF 14 FEET IN THE CHANNEL BETWEEN NAVY AND GRAND ISLANDS LEADING TO THE FOOT OF SUGAR STREET, IN THE CITY OF NIAGARA FALLS.

FEBRUARY 19, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 17, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 16th instant, together with copies of reports from Lieut. Col. J. G. Warren, Corps of Engineers, dated May 20 and December 2, 1911, with map, on preliminary examination and survey, respectively, of Niagara River, N. Y., made by him in compliance with the provisions of the river and harbor act of February 27, 1911.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 16, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated May 20 and December 2, 1911, with map, by Lieut. Col. J. G. Warren, Corps of Engineers, on preliminary examination and survey, respectively, of Niagara River, N. Y., with a view to securing a depth of 14 feet in the channel between Navy and Grand

Digitized by Google

Islands leading to the foot of Sugar Street, in the city of Niagara Falls, prepared in pursuance of a call in the river and harbor act approved February 27, 1911.

A channel 12 feet deep and 200 feet wide has been provided by the United States in Niagara River on the east side of Grand Island from Tonawanda to the city of Niagara, all in American waters. The only commerce on the river which calls for a greater depth is the pulp wood received via the channel on the west side of Grand Island in Canadian waters, which has a controlling depth of 13½ feet to the foot of Grand Island and 12 feet thence to the dock at the foot of Sugar Street. The improvement desired is a channel from the Canadian Channel to Niagara Falls with a depth of 14 feet.

As stated by the district officer, such a channel with a turning basin at its foot will require the following work: (I) Dredging a channel 300 feet wide opposite Navy Island Dock & Camp, all in Canadian waters; (II) dredging a channel 400 feet wide across the shoal at the foot of Buckhorn Island, in American waters; (III) dredging in the Schlosser Channel 300 feet wide in front of Niagara Falls; and (IV) dredging a turning basin at the foot of Schlosser Channel 600 feet by 520 feet, all as indicated on the accompanying map, at a total estimated cost of $95,000 (in round numbers). For the present, however, the district officer recommends only the channel across the shoal at the foot of Buckhorn Island and the Schlosser Channel, designated as (II) and (III) above, at an estimated cost of $55,125, and then only on condition of local cooperation to the extent of 50 per cent; also that this work be done with a view to the future improvement of items (I) and (IV) as outlined above, should the needs of commerce demand them. The district officer recommends the construction of a channel to the proposed municipal dock in the future, should such improvement be found desirable and necessary, provided the city of Niagara Falls pays 50 per cent of the cost. Maintenance of the work recommended is estimated to cost $1,000 annually.

The division engineer concurs in the opinion that this improvement should not be undertaken by the United States unless one-half its cost is defrayed by local interests.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose report, dated January 22, 1912, herewith, attention is invited. The board concurs with the district officer and division engineer that the only improvement advisable at the present time is that designated in items (II) and (III) and on the basis that 50 per cent of the cost be paid by the interests benefited.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer and the Board of Engineers for Rivers and Harbors; and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Niagara River, N. Y., from the foot of Grand Island to Sugar Street in Niagara Falls, is deemed advisable so far as to secure an available harbor or channel depth of 14 feet and a channel width of 400 feet in section (II) and 300 feet in section (III), following in general the methods described in the report of the district officer, at an estimated cost of $55,125 for first construction and $1,000 annually for maintenance, this work, however not to be undertaken until local interests have contributed 50 per

Digitized by Google

cent of the cost of the construction work. These estimates are based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $27,562.50 by the United States.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF NIAGARA RIVER, N. Y.

UNITED STATES ENGINEER OFFICE,
Buffalo, N. Y., May 20, 1911.

GENERAL: In compliance with instructions in department letter dated April 7, 1911, I have the honor to submit the following report on preliminary examination of Niagara River, N. Y., with a view to securing a depth of 14 feet in the channel between Navy and Grand Islands, leading to the foot of Sugar Street, in the city of Niagara Falls:

The locality is shown on United States Lake Survey chart "Buffalo Harbor and Niagara River to the Falls," index No. 312, being that part of the waters of Niagara River from the lower end of the west or Canadian channel around the foot of Grand (Buckhorn) Island to the Schlosser Channel and through that channel to the small natural harbor between Conners Island and the main shore. The foot of Sugar Street, Niagara Falls, is at the downstream end of this small harbor, and the wharf there located is commonly known as Schlossers Dock.

Previous preliminary examinations involving the locality have been made and reported upon as follows:

(*a*) Niagara River from Tonawanda to Gill Creek, N. Y. Report dated May 17, 1907. (Printed in H. Doc. No. 75, 60th Cong., 1st sess.)

(*b*) Niagara River, N. Y., with a view to securing a depth of 18 feet from Black Rock Harbor to the foot of Sugar Street in the city of Niagara Falls by way of the channel on the east side of Grand Island; also between the points named above by way of the channel on the west side of Grand Island between said island and Navy Island. (Report dated Oct. 17, 1910; supplemental report dated Jan. 23, 1911. See H. Doc. No. 286, 62d Cong., 2d sess.)

The following data are derived from the latter report, with revisions and additions, to bring them up to date.

The stretch of channel under consideration is in extension of the channel on the west side of Grand Island. This channel, from Black Rock Harbor to Schlosser's dock is 14¾ miles long. There are five shoal stretches, at the upstream and downstream ends, and three intermediate, aggregating 6¾ miles in length, on which the depth is less than 18 feet at mean river level with controlling depth of 13½ feet to the foot of Grand Island and 12 feet thence to Schlosser's dock. The remaining 8 miles is made up of pools 18 to 30 feet deep at mean river level. This channel is used by lake vessels of 12 to 13½ feet draft delivering pulpwood in the storage boom at the foot of Grand Island, as hereinafter described. It lies wholly in Canadian waters, down to the storage boom, the international boundary line being about 300 feet out from the Grand Island shore.

There are no commercial establishments or interests on the American (Grand Island) side or on the Canadian side, and there are no

Digitized by Google

docks or landings, except five at summer resorts on Grand Island used by excursion steamers of 6 to 8 feet draft.

The stretch of channel from the storage boom around the foot of Grand Island to Niagara Falls, N. Y., is the subject of this preliminary examination.

The present natural channelway is 12,500 feet long, with controlling depth of 12 feet at mean river level in the narrow part, off the end of Grand (Buckhorn) Island where marked by Buckhorn Island Channel Buoys Nos. 1, 2, and 3, as shown on the Lake Survey Chart.

The part of the channel above Conners Island, "Schlosser's Channel," 2,300 feet long, was dredged 200 feet wide and 12 feet deep at low river level, by the United States, under project adopted in 1894 at a cost of $24,375.55, in 1894–95.

There are no landings until the small natural harbor between Conners Island and the mainland is reached at the city of Niagara Falls. Here there are two docks, each about 200 feet long, one at the foot of Iroquois Street, and one at the foot of Sugar Street (Schlossers dock). Both of these docks are in dilapidated condition, but rebuilding them with concrete superstructure was in progress in May, 1911.

Both docks and all of the river frontage for three-fourths mile upstream and 1¾ miles downstream therefrom are owned by the Niagara Falls Power Co. The Niagara Falls Junction Railway has tracks along this frontage with a switch track to the Iroquois Street Dock. The depth of water available at both docks is 12 feet.

As shown by copy of letter herewith from Mr. J. E. Montague, president of the board of harbor commissioners, Niagara Falls, N. Y., that city proposes to erect a dock along the new city waterworks station frontage. This dock is proposed to be about 450 feet long on the river front, along which the present depth of water is about 6 feet. The site is about 4,500 feet above the Sugar Street Dock and about 1,000 feet upstream from the channel under consideration herein.

In view of the fact that a considerable amount of channel excavation additional to that understood to be contemplated under this preliminary examination would be required to make the proposed city docks available to lake vessels, it is believed that this proposed dock can not be considered as a relevant terminal and transfer facility.

This channel is used by passenger and freight boats of less than 10 feet draft. The passenger business consists of excursions from Buffalo on steamers of 6 to 8 feet draft, usually accompanied by a picnic barge of 2 to 4 feet draft towed alongside. During the season of about four months, June to September, from one to five of these vessels daily carry parties down the American channel, around the foot of Grand Island, and return to Buffalo by the Canadian channel. excursion passengers carried in 1910, 98,627. Occasionally a party is landed at Schlossers Dock, five such landings having been made during the season of 1910. This passenger business will probably continue and may increase with the increase of population along the Niagara frontier.

The freight business consists of raw materials carried on canal boats of 6 to 8 feet draft, towed by tugs from the Erie Canal at Tonawanda to Schlossers Dock. The extent of this business for the past 15 years is shown in the following table, compiled from Annual Reports of the Chief of Engineers and reports received from the collector of customs Niagara Falls, N. Y.:

Digitized by Google

Freight received at Schlossers Dock via Niagara River channel from Tonawanda.

Years.	Pulp wood.	Rosin, potash, clay, sulphur nitrates, rock, etc.	Years.	Pulp wood.	Rosin, potash, clay, sulphur nitrates, rock, etc.
	Tons.	*Tons.*		*Tons.*	*Tons.*
1895	300	100	1903		3,095
1896			1904		
1897			1905		
1898			1906		
1899		1,410	1907		
1900		1,517	1908		
1901		1,579	1909		
1902		135	1910		

It is probable that the constantly increasing manufacturing interests at Niagara Falls and the construction of the New York State barge canal will in time revive and possibly develop a greater traffic by river in connection with this canal. The existing 12-foot channel is of the same depth as the barge canal and meets all requirements for canal-barge navigation.

The only existing commerce in connection with the Great Lakes is the receipt of pulp wood exclusively for the paper mills of the International Paper Co. at Niagara Falls. This pulp wood comes partly from American ports and partly from Canadian ports on the Great Lakes. It is brought down the Canadian channel on lake vessels of 12 to 13 feet draft to a point on Grand Island opposite Navy Island, where it is thrown overboard into a storage boom, made into sack rafts, and towed by a tug through the Buckhorn Island channel to Schlossers Dock. Here the rafts are opened, and the sticks floated through a runway down the river past Gill Creek into a boom at Grass Island, from which they are conveyed to the paper mills by an endless-chain carrier.

The amount of pulp wood thus received is shown in the following table compiled from Annual Reports of the Chief of Engineers, United States Army, and reports received from the collector of customs, Niagara Falls, N. Y.:

Pulp wood received at Schlossers Dock via the west or Canadian channel of Niagara River from Lake Erie.

Years.	Vessels.		Pulp wood.	
	Number.	Net tonnage.	Short tons.	Value.
1896	(1)	(1)	28,254	$113,136
1897	(1)	(1)	36,000	144,000
1898	(1)	(1)	70,764	283,056
1899	(1)	(1)	84,418	337,672
1900	(1)	(1)	76,000	304,000
1901	(1)	(1)	52,000	208,000
1902	(1)	(1)	30,000	120,000
1903	(1)	(1)	102,250	409,000
1904	121	52,092	84,149	336,596
1905	88	51,748	100,000	400,000
1906	45	26,978	106,250	425,000
1907	91	62,803	20,828	41,656
1908	65	(1)	42,898	107,715
1909	76	38,762	53,162	132,905
1910	106	53,960	87,962	351,848
			93,474	396,873

[1] Not obtainable.

Average haul or distance freight was carried in 1910, 675 miles.
Rate per ton-mile, in 1910, 2.66 mills.

Digitized by Google

The transfer of this pulpwood in rafts incurs expense and inconvenience to this traffic. Lake vessels of 12 to 13½ feet loaded draft are the lightest draft vessels that can be economically employed in the transportation of pulpwood from upper lake ports. These vessels can navigate the west or Canadian channel of the Niagara River no farther than the storage boom; the existing channel thence to Niagara Falls being narrow and tortuous, with not over 12 feet ruling depth at mean river level.

Improvement to the extent of providing a channel of a width usable by the class of vessels carrying pulpwood and depth of 14 feet would be a benefit to existing traffic; and while further development of traffic is speculative and problematical, it may develop with changes in lake traffic methods now apparent.

Up to 1910, traffic by lake vessels drawing 12 to 14 feet was restricted to small craft loaded to their full capacity. The conditions of lake commerce have, however, changed, and now, with peculiar conditions of vessel tonnage supply and freight rates, large deep-draft vessels can be, and are, chartered to carry cargoes of iron ore, etc., which only partially load them.

This change has affected Niagara River traffic so that, where formerly small vessels of not over 2,000 tons capacity, loaded to maximum draft of 15 feet, commanded the trade, a large part of it is now carried on by vessels of over 5,000 tons full capacity which are loaded to the river draft of 13 to 15 feet, and thus deliver cargoes (principally iron ore at North Tonawanda) of over 3,000 tons.

The proposed improvement would imply deepening of shoal parts of the channel, which is about 12,500 feet long, located wholly in United States waters. Channel deepening would be required over 1,000 feet or more of the shoal or bar at the foot of Buckhorn Island and over shoal spots thence to the head of the existing Connors Island channel; whence there is an available depth of 14 feet, except on shoal spots in Connors Island channel, to the Iroquois and Sugar Street docks in Niagara Falls, N. Y.

The extent of the required improvement can not be determined except by a special survey, there being no survey data available that will admit of even a fairly approximate location of the most advantageous channel and the amount and cost of excavation to obtain it.

In view of the facts, that the only existing traffic is that of pulpwood for one corporation, and that the question of worthiness of improvement depends largely on the commensurateness of cost thereof to the existing traffic, a survey and estimate of cost is deemed essential to determine whether or not the channel is worthy of improvement by the United States.

It is therefore recommended that such survey be made at an estimated cost of $800.

The views of parties interested in the proposed improvement having been fully expressed in the series of letters accompanying the report of October 17, 1910, no further call for such data was considered necessary.

Very respectfully, your obedient servant,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army.
(Through the Division Engineer)

Digitized by Google

[First indorsement.]

OFFICE OF DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., June 27, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

A depth of 14 feet is unusual in a project for United States harbors on the upper lakes. Early projects were for 12 feet, and the tendency was for harbors to be deepened to 16 feet, when that depth was adopted for the channels connecting the Great Lakes. The construction of cargo steamers has very generally conformed to the depths given to the harbors, the older vessels being designed for a 12-foot channel and those constructed in later years for a channel of 16 feet or over. The existing channel of the Niagara River is of sufficient depth to provide for navigation by the former type of vessel, but it is claimed by interested parties that there is sufficient commerce in vessels of the latter class, which sail from Canadian ports and are only loaded to a draft of 14 feet, to justify the creation of a 14-foot channel.

As a small expenditure for this purpose is considered justifiable, the recommendation of the district officer for a survey to determine the cost is concurred in.

G. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 1, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

The Niagara River has been improved under a project which provides for a channel on the American side 12 feet deep and 200 feet wide from Tonawanda to the city of Niagara. Quite a number of passengers, but practically no freight, are carried over this route, and the channel dimensions appear sufficient for the vessels engaged in this business.

The only commerce on the river which calls for a greater depth than that existing is the pulpwood received via the channel on the Canadian side of the river. This channel is about 14¾ miles in length, with a controlling depth of 13½ feet to the foot of Grand Island, opposite Niagara, and 12 feet thence to the dock at the foot of Sugar Street. The records show that about 50,000 to 100,000 tons of pulp wood are received annually. This is carried on vessels loaded to a draft of 12 to 13 feet. These vessels proceed to the foot of Grand Island, where they unload into timber booms, as they are unable to reach the city of Niagara. From the booms the lumber is rafted to its destination. From the boom over to a wharf at Niagara the natural channelway is 12,500 feet long, and is in American waters.

The improvement desired is a channel connecting the Canadian channel with Niagara Falls 14 feet in depth, in order that vessels loaded to the full capacity of the Canadian channel can proceed to Niagara without unloading at the boom, as they do at present. The district officer and the division engineer believe the locality worthy of a survey to determine the cost of the work, on which its advisability in a large measure depends.

Digitized by Google

The commerce involved is sufficient to warrant a moderate expenditure for its benefit. It appears that all this commerce is controlled by one company, however, and the question therefore arises as to whether the work should be done by the company, by the United States, or through the cooperation of both.

The board believes that the cost of the work and the question of whether local cooperation can be expected should be determined in order to properly pass upon the question of the advisability of the improvement. It therefore recommends that a survey and estimate be made and that the question of local cooperation be investigated.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, August 9, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Niagara River, N. Y., authorized by the river and harbor act of February 27, 1911.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality as proposed be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT,
August 10, 1911.

Approved as recommended by the Chief of Engineers.

JNO. C. SCOFIELD,
Assistant and Chief Clerk,
(For the Secretary of War in his absence).

SURVEY OF NIAGARA RIVER, N. Y.

UNITED STATES ENGINEER OFFICE,
Buffalo, N. Y., December 2, 1911.

SIR: In compliance with department letter of August 14, 1911 I have the honor to submit the following report on a survey, including preparation of plan and estimate of cost of improvement and maintenance, of Niagara River, N. Y., with a view to securing a depth of 14 feet in the channel between Navy and Grand Islands, leading to the foot of Sugar Street, in the city of Niagara Falls.

A preliminary examination of this proposed improvement was made and report thereon submitted May 20, 1911. The existing waterway and the commercial and other interests involved, both present and prospective, are described at length in that report and need not be repeated here.

Digitized by Google

A hydrographic survey of Niagara River in the vicinity of Niagara Falls which fully covered the locality to be examined for the proposed 14-foot channel was made by the United States Lake Survey in August, 1911. This hydrography was based upon a topographic survey made in 1910 by the International Waterways Commission. It having been found that this survey would supply all necessary data, the field notes thereof were borrowed from Lieut. Col. C. S. Riché, Corps of Engineers, and duplication of survey work and cost thus avoided. Plotting of the survey notes was begun and completed, together with a finished map of the locality, in October, 1911. A tracing [1] of this map is submitted herewith.

Determination of the question of advisability of the proposed improvement implies determination of the cost of improving an adequate usable channel, not necessarily an existing channel.

In this connection it is necessary to consider the following conditions:

(*a*) That the channel is desired for vessels now delivering pulp wood at the boom in the Navy-Grand Island Channel, the largest of which vessels in 1910 was 435 feet long, about 50 feet beam, 13 feet 1 inch draft.

(*b*) That owing to its proximity to the rapids above the Niagara cataract, the channel must be adequate for extra safe navigation.

(*c*) That the channel terminating abruptly at Sugar Street Wharf implies a turning basin at that point to enable large vessels to depart therefrom.

"A depth of 14 feet in the channel" is herein considered to mean that depth at the water level making 14 feet depth at controlling points in the Canadian channel of Niagara River leading to the proposed channel; which water level, as near as it can be determined from available data, is at 0.6 feet below mean river level at the Sugar Street (Schlosser's) Dock. This level corresponds to one foot below mean level on Lake Erie and is a fairly low stage; the lowest stage during the navigation season, viz, in October-December, being about 4 inches lower, corresponding to 1½ feet below mean level on Lake Erie.

The width of channel considered necessary to meet the requirements of (*a*) and (*b*) is 300 feet, except for the channel across the foot of Buckhorn Island, where cross currents and liability to filling in would require a channel at least 400 feet wide.

As shown on the accompanying map, the requisite channel exists to the pulp wood storage boom and to secure the proposed channel will require work of improvement across shoals between deep-water pools at the following localities:

I. Opposite Navy Island Dock. A Camp.
II. Across the foot of Buckhorn Island.
III. Schlosser Channel.
IV. Turning Basin.

To secure the depth of 14 feet as herein proposed would require, allowing 0.4 foot overdepth in dredging, viz, to 15 feet at mean river level:

At I. Channel 1,600 feet long, 300 feet wide, excavation 12,000 yards, scow measure, sand, clay, etc., at 25 cents per cubic yard..... $3,000
This shoal lies wholly in Canadian waters.

At II. Channel 2,400 feet long, 400 feet wide, excavation 100,000 cubic yards, scow measure, sand, clay, etc., at 25 cents per cubic yard..... 25,000
All in United States waters.

[1] Not printed.

Digitized by Google

At III. Channel 4,800 feet long, 300 feet wide, excavation 110,000 cubic yards, scow measure, sand, clay, etc., at 25 cents per cubic yard..... $27,500
All in United States waters.
At IV. Turning basin 600 feet long, 520 feet wide, excavation 40,000 cubic yards, scow measure, sand, clay, etc., at 25 cents per cubic yard..... 10,000
Excavation 25,000 cubic yards, scow measure, hardpan, loose rock, and bedrock, at $1 per cubic yard..... 25,000
Basin would encroach upon under-water lands of the Niagara Falls Power Co., as shown on the map; about 1½ acres.

From the foregoing alternative estimates of cost may be made as follows:

For the whole, including turning basin:

Item I	$3,000
Item II	25,000
Item III	27,500
Item IV	35,000
	90,500
Contingencies and engineering, 5 per cent	4,500
Total	95,000

The channel off Navy Island Dock, △ camp, is wholly in Canadian waters; and is nearly all of the proposed depth and navigable with slight restriction.

The turning basin would be required only for vessels over 350 feet long and such vessels departing from Sugar Street Dock could be towed stern first by tug up Schlosser Channel and turned in the deep-water pool at its head.

Omitting these two items, viz, I and IV, would make the estimate of cost:

Item II	$25,000
Item III	27,500
	52,500
Contingencies and engineering, 5 per cent	2,625
Total	55,125

Maintenance would be confined almost entirely to Item II, and the cost thereof would probably not exceed $1,000 per annum.

It will be noted that the channel across the foot of Buckhorn Island as planned and estimated for is a straight artificial one across the bar. This location is considered, and is also regarded by vessel masters, as the correct one for safe navigation by loaded vessels to the exclusion of the natural channel around the end of the bar, to navigate which would require making a sharp turn in the pool near the foot of Navy Island, as shown on the map. Making this turn would be difficult for down-bound loaded vessels and would not be feasible for upbound vessels.

The natural channel could be made 400 feet wide and 14 feet deep by excavation of 60,000 cubic yards, scow measure, of sand, clay, etc., at an estimated cost of $15,750, compared to $26,250 for the straight cut across the bar.

The object of the proposed improvement, as fully brought out in the preliminary examination report, is, primarily, to provide a channel of a width and depth usable by lake vessels, engaged in the only existing traffic, viz., that of supplying pulpwood to the mills at Niagara Falls, N. Y.

Digitized by Google

This pulpwood comes partly from American ports and partly from Canadian ports on the Great Lakes. It is brought down the Canadian channel on lake vessels of 12 to 13 feet draft to a point on Grand Island opposite Navy Island, where it is thrown overboard into a storage boom, made into sack rafts and towed by a tug across the main channel to Schlossers Dock. Here the rafts are opened and the sticks floated through a runway down the river past Gill Creek into a boom at Grass Island, from which they are conveyed to the paper mills by an endless-chain carrier.

The amount of pulpwood thus received is shown in the following table compiled from Annual Reports of the Chief of Engineers, United States Army, and reports received from the collector of customs, Niagara Falls, N. Y.:

Pulpwood received at Schlossers Dock via the west or Canadian channel of Niagara River from Lake Erie.

Years.	Vessels.		Pulpwood.	
	Number.	Net tonnage.	Net tons.	Value.
1895	(1)	(1)	28,284	$113,136
1896	(1)	(1)	36,000	144,000
1897	(1)	(1)	70,764	283,056
1898	(1)	(1)	84,418	337,672
1899	(1)	(1)	76,000	304,000
1900	(1)	(1)	52,000	208,000
1901	(1)	(1)	30,000	120,000
1902	(1)	(1)	102,250	409,000
1903	(1)	(1)	84,149	336,596
1904	121	52,092	100,000	400,000
1905	88	51,748	106,250	425,000
1906	45	26,978	20,828	41,635
1907	91	62,803	42,898	107,715
1908	65	(1)	53,162	132,906
1909	76	33,762	87,962	351,848
1910	.....	.....	93,474	396,873

[1] Not obtainable.

The transfer of this pulp wood in rafts from the storage boom in the channel east of Navy Island to Niagara Falls, N. Y., via the channel around the foot of Grand Island, incurs expense and inconvenience to this traffic. Lake vessels of 12 to 13½ feet loaded draft are the lightest-draft vessels that can be economically employed in the transportation of pulp wood from upper lake ports. These vessels can navigate the west or Canadian channel of the Niagara River no farther than the storage boom; the existing channel thence to Niagara Falls being narrow and tortuous, with not over 12 feet ruling depth at mean river level, as shown on the map herewith.

The pulp-wood traffic of a value of, say, $300,000 per annum is likely to continue. The development of other traffic in connection with the Great Lakes is, however, speculative and problematical.

It is possible that a downbound traffic in raw materials, such as iron ore and coal, may be created in connection with the growth of manufacturing plants at Niagara Falls.

It does not appear probable, however, that an upbound traffic will develop to any material extent; for the reason that it would be practically limited to manufactured articles or products, i. e., package freight. And when it is considered that this class of freight is usually

Digitized by Google

shipped in much less than vessel-load quantities and to widely scattered destinations most conveniently, and largely most economically, reached by rail, it does not seem probable that much of this shipment would seek the proposed water route.

In the preliminary examination report the lack of wharf facilities Iroquois to Sugar Street, Niagara Falls, was noted. During 1911, the old dilapidated wharves were rebuilt with concrete superstructures by the Niagara Falls Power Co. and are now in good condition; located as shown on the map. These wharves and extension between them proposed by the Niagara Falls Power Co. will furnish adequate terminal facilities for existing commerce and a considerable development, in connection with the proposed improvement.

As shown on the map, the entire frontage in the city of Niagara Falls along the proposed channel is owned by the Niagara Falls Power Co. The city owns a frontage at the new city waterworks above the proposed channel, also shown on the map.

The board of harbor commissioners, Niagara Falls, N. Y., desire that the proposed channel should extend to and along the city frontage.

Correspondence in the matter was had as follows:

BOARD OF HARBOR COMMISSIONERS,
Niagara Falls, N. Y., April 14, 1911.

DEAR COL. WARREN: I inclose herewith a copy of my letter to Mr. Simmons and his reply thereto, regarding appropriation made for survey for a 14-foot channel from the foot of Buckhorn Island to Schlossers Dock; this should cover survey from foot Buckhorn Island to the proposed municipal dock to be located at the city line, and thence down the river to Schlossers Dock. Will you kindly inform me if you can include this complete survey in making up estimate?

I have been endeavoring to get to Buffalo to see you regarding this subject, but owing to the pressure of business it has been impossible to do so.

Believe me, with best regards, very truly, yours,

J. E. MONTAGUE, *President.*

Lieut. Col. J. G. WARREN,
United States Engineer,
540 Federal Building, Buffalo, N. Y.

MARCH 23, 1911.

DEAR CONGRESSMAN: I have just learned that the amount specified in the last rivers and harbors bill covers survey for 14-foot channel from the foot of Buckhorn Island to Schlossers Dock; this survey should cover from the foot of Buckhorn Island to the proposed new municipal dock at the city line and thence down the river to Schlossers Dock; will you kindly see that this survey is made complete?

Believe me, with best regards, very truly yours,

J. E. MONTAGUE, *President*

Hon. JAMES S. SIMMONS, *Congressman,*
Niagara Falls, N. Y.

NIAGARA FALLS, N. Y., *March 24, 1911.*

MY DEAR MR. MONTAGUE: I have your favor of the 23d instant. While it is true the authorization in the rivers and harbors bill called for estimate and report on a 14 foot channel from Buckhorn Island to Schlossers Dock, nevertheless I am inclined to believe that if the engineers in Buffalo understand our wants, that they will include the city dock in the estimate. I think it would be well if you, as chairman of the harbor commission, would see Col. Warren and ascertain if he would not be willing to cover this point in his report, and I would be greatly pleased if you will advise me of his decision in the matter. I am, of course, most anxious to do anything I can to get the estimate to cover this point, and I am satisfied this would be much the easiest way to do it.

Digitized by Google

With kindest regards and hoping that I may have the pleasure of seeing you before I leave the city, I am,

Yours, very truly, JAS. S. SIMMONS.

Mr. J. E. MONTAGUE,
Niagara Falls, N. Y.

BUFFALO, N. Y., *April 24, 1911.*

SIR: Referring to your letter of the 14th instant, the proposed municipal dock at the Niagara Falls city line would, it is believed, be off the line of a channel for which a preliminary examination is provided in the rivers and harbors act approved February 27, 1911, as follows:

"Niagara River, N. Y., with a view to securing a depth of fourteen feet in the channel between Navy and Grand Islands leading to the foot of Sugar Street in the city of Niagara Falls."

In order to have complete data relating to "terminal facilities" for the forthcoming report on preliminary examination, it is requested that information be furnished this office as to the location and length of frontage of the proposed municipal dock, what provision has been made for its construction, and when it is to be constructed.

Respectfully,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

Mr. J. E. MONTAGUE,
President Board of Harbor Commissioners,
Niagara Falls, N. Y.

NIAGARA FALLS, N. Y., *May 17, 1911.*

DEAR SIR: Replying to your esteemed favor of the 24th ultimo, I inclose herewith map of the city of Niagara Falls showing the location of the proposed municipal dock; also blue print showing dock in detail; the site is now owned by the city of Niagara Falls and has been approved by the board of water commissioners and by this board; we hope to be able to erect this dock at an early date and will be guided largely in our actions in this respect by the course taken by the Federal Government with regard to the proposed 14-foot channel.

Very truly, yours,

J. E. MONTAGUE,
President Board of Harbor Commissioners.

Lieut. Col. J. G. WARREN,
540 Federal Building, Buffalo, N. Y.

The survey necessarily covered the city frontage, but, as stated in the above-quoted letter of April 24, 1911, the proposed municipal dock is believed to be off the line of a channel for which a preliminary examination is provided in the river and harbor act approved February 27, 1911.

A 14-foot channel along this frontage of 1,000 feet has not been included in the estimates; excavation thereof would amount to 60,000 cubic yards, scow measure, of sand and clay, at an estimated cost of $15,750.

The plans for the city dock are only tentative and it is not clear as to what purpose the dock would serve. It may be assumed that the filling-in of the underwater lands and building of the dock would primarily enter into a plan for a waterworks park and the dock serve as an excursion-boat landing. It is not evident, however, wherein dock facilities at this locality would serve a commercial purpose.

The new waterworks, completed in 1911, are equipped with electric motive power only. The dock would not, therefore, be utilized for receiving coal by the water route. Moreover, coal, if used, would probably be more advantageously shipped in by rail. as at the waterworks at Buffalo and the Tonawandas. The terminal facilities of the Niagara Falls Power Co. with railroad connection being adequate for

Digitized by Google

quite extensive commercial requirements, it is not clear wherein the proposed city dock would fill any commercial want.

In view of the foregoing it is considered that improvement of the proposed channel by the United States is justifiable only to a restricted extent under conditions and for reasons as follows:

(1) To the extent of excavation and maintenance of the 14-foot channel 400 feet wide across the foot of Buckhorn Island and Schlosser Channel 300 feet wide, estimated cost, $55,125; maintenance for 10 years, $5,000; total estimated cost, $60,125.

(2) That in view of the fact that the existing commerce and prospective commerce is controlled by one company, viz, the Niagara Falls Power Co., the said company should cooperate with the United States by paying not less than 50 per cent of said cost of $60,125.

(3) That improvement to this restricted extent be made with a view to the excavation of the Navy Island, A Camp, channel and the turning basin; estimated cost $39,900, at some future time, provided commercial development proves such additional excavation necessary and provided the Niagara Falls Power Co. agrees to further cooperate with the United States by paying not less than 50 per cent of the said cost of $39,900.

(4) With a view to excavation of the 14-foot channel along the 1,000 feet of the city dock front, estimated cost $15,750 when the city of Niagara Falls builds said dock and provided the city agrees to cooperate with the United States by paying not less than 50 per cent of the said cost of $15,750.

Determination of the question as to whether or not cooperation can be expected from the Niagara Falls Power Co. was undertaken as shown by the following correspondence:

BUFFALO, N. Y., *November 10, 1911.*

GENTLEMEN: Report on a survey and estimate of cost for a proposed 14-foot channel in Niagara River from Navy Island to the foot of Sugar Street, Niagara Falls, N. Y. is in preparation at this office.

The authorization for this survey and report thereon provides that, in view of the fact that the existing river commerce at the locality is controlled by one corporation viz, the Niagara Falls Power Co., the question should be determined whether the proposed improvement should be made by this company, by the United States, or through the cooperation of both.

This determination will be of weight in passing upon the question of advisability of improvement, for the reason that the survey will show that to secure a channel and turning basin usable by vessels up to 435 feet in length, cited in your letter of January 19, 1911, will imply a considerable cost.

The views and decision of the Niagara Falls Power Co. and allied interests on the question of cooperation are asked for, and it is requested that it be furnished by November 22, in order that the report of survey may be completed and forwarded to Washington by December 1.

Respectfully,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

NIAGARA FALLS POWER CO.
(Through Philip P. Barton, vice president and general manager, Niagara Falls, N. Y.)

NIAGARA FALLS, N. Y., *November 21, 1911.*

DEAR SIR: We acknowledge the receipt of your communication of the 10th instant in regard to report on survey and estimate of cost for a proposed 14-foot channel in Niagara River from Navy Island to the foot of Sugar Street, in which you ask for the views and decision of the Niagara Falls Power Co. on the question of its cooperation in carrying out the proposed improvement.

The statement that the existing river commerce at the locality is controlled by the Niagara Falls Power Co., we presume is based on the circumstance that this company, at its own cost, has provided docks for the purpose of facilitating the existing and prospective commerce of a population of some 35,000 people who presumably will benefit from such commerce. The proposed channel, however, would provide at little or no additional expense access to dock sites that are neither owned nor controlled by this company.

Digitized by Google

We respectfully submit for your consideration the following facts:

Some 19 or 20 years ago, at a cost of between $18,000 and $19,000, we constructed at the foot of Iroquois Street a very substantial cribwork dock. Last spring this dock was rebuilt and was provided with a seawall of monolithic concrete at a cost of nearly $4,500. Our original investment in this structure has not been remunerative, and if we add to the original cost thereof, interest less the amounts of revenue that we have derived from it, we find that our investment up to date in the Iroquois Street Dock aggregates nearly $40,000. This year, at a cost of approximately $13,000, we have constructed at the foot of Sugar Street, a concrete dock 200 feet long.

It will thus be seen that we have made an aggregate investment for the purpose of promoting traffic in the Niagara River amounting to upward of $50,000. This investment has been made in the belief that a large additional amount of river traffic will develop to and from Niagara Falls if facilities are provided for it and in the faith that on the exhibition of such substantial improvements, not merely promised but actually created by private expenditure, the Government would make such reasonable appropriations as may be required from time to time to accommodate the expected traffic. We have not, therefore, supposed that the completion of the designated 14-foot channel would be conditioned upon further expenditure on the part of this company. Should the department, however, adopt a different view, we shall be glad to be heard in the matter before a conclusion is reached in respect of a recommendation for appropriation.

Very truly, yours,

PHILIP P. BARTON,
Vice President and General Manager Niagara Falls Power Co.

Lieut. Col. J. G. WARREN,
Corps of Engineers, U. S. Engineer Office,
540 Federal Building, Buffalo, N. Y.

The statement in the second paragraph of the above-quoted letter of the Niagara Falls Power Co., "The proposed channel, however, would provide at little or no additional expense access to dock sites that are neither owned or controlled by this company," can be applied only to the city waterworks site.

The statement in the last paragraph of the same letter, referring to the company's expenditure for docks, "This investment has been made * * * in the faith that on the exhibition of such substantial improvements, * * * the Government would make such reasonable appropriations as may be required from time to time to accommodate the expected traffic," recalls the fact that these are the only terminal facilities available, and it is considered, in view of the sole control thereof by the Niagara Falls Power Co., that further cooperation by the company as hereinbefore provided is justifiable.

It is understood that final and definite determination of the question of cooperation is dependent upon approval of the proposed plan of improvement, and that, pursuant thereto, hearing in the matter will be obtainable by the Niagara Falls Power Co. as suggested in the last sentence of the company's letter.

In case the project is adopted by Congress, it would be most advantageous to do the work under one contract with funds provided in one appropriation to cover all of the excavation of the channel across the foot of Buckhorn Island and Schlosser Channel, viz, $55,125, less such amount as may be required to be paid by the Niagara Falls Power Co.

Very respectfully, your obedient servant,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

Digitized by Google

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF THE DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., December 27, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer that the improvement should not be undertaken by the United States unless one-half its cost is defrayed by local interests.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 22, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The district officer presents herein a plan for carrying out the purposes of the act, which has in view the construction of a channel 14 feet deep in the channel between Navy and Grand Islands leading to the foot of Sugar Street in the city of Niagara Falls, involving four items: (1), $3,150; (2), $26,250; (3), $28,875; (4), $36,750, all as shown on accompanying map, making a total of $95,025. Items 1 and 4 are not of prime importance, and the object of the desired improvement may be attained by omitting these two, which would reduce the cost of the proposed channel to $55,125. The cost of maintenance will probably not exceed $1,000 per annum. An estimate of $15,750 is also given for dredging a channel giving access to the proposed city dock.

The district officer states that the object of the proposed improvement as fully brought out in the preliminary examination is primarily to provide a channel of width and depth usable by lake vessels engaged in the only existing traffic, viz, that of supplying pulpwood to the mills at Niagara Falls. This traffic has a value of about $300,000 per annum and is likely to continue. The development of other traffic in connection with the Great Lakes is, however, problematical.

In view of all the circumstances, he reports that improvement is justifiable by the United States only to a restricted extent and under conditions as follows:

(*a*) To the extent of excavation and maintenance of the 14-foot channel 400 feet wide across the foot of Buckhorn Island and Schlosser Channel 300 feet wide; estimated cost, $55,125; maintenance for 10 years, $5,000; total estimated cost, $60,125.

(*b*) That in view of the fact that the existing commerce and prospective commerce is controlled by one company, viz, the Niagara Falls Power Co., the said company should cooperate with the United States by paying not less than 50 per cent of said cost of $60,125.

(*c*) That improvement to this restricted extent be made with a view to the excavation of the Navy Island △ camp, channel and the turning basin; estimated cost $39,900, at some future time, provided commercial development proves such additional excavation necessary; and provided the Niagara Falls Power Co. agrees to further cooperate

Digitized by Google

with the United States by paying not less than 50 per cent of the said cost of $39,900, and

(*d*) With a view to excavation of the 14-foot channel along the 1,000 feet of the city dock front, estimated cost $15,750, when the city of Niagara Falls builds said dock and provided the city agrees to cooperate with the United States by paying not less than 50 per cent of the said cost of $15,750.

The division engineer concurs in the opinion of the district officer that this improvement should not be undertaken by the United States unless one-half its cost is defrayed by local interests. The correspondence quoted by the district officer with the Niagara Falls Power Co., with a view to determining whether or not cooperation can be expected, indicates that local interests are opposed to a requirement of this character.

At the request of interested parties a hearing was given at the board's office on January 15, which was attended by Hon. James S. Simmons, M. C., and several gentlemen representing interests to be affected by the proposed improvement.

The board has carefully considered this subject and has arrived at the conclusion that a limited improvement with a view to facilitating water-borne commerce is justified. It is clear to the board, however, that the benefits to be expected will be largely confined to one industry which will apparently realize large annual savings as a result of the improvement, and which should therefore bear a share of the expense of the work. The board therefore reports that in its opinion it is advisable for the General Government to undertake the improvement of Niagara River as proposed in items 2 and 3 within at an estimated cost of $55,125 for construction and about $1,000 annually for maintenance, the United States to do the work and assume future maintenance, provided, however, that before the work is commenced local interests contribute one-half the estimated cost of construction, viz, $27,562.50. The total amount of the United States share of the cost of construction $27,562.50, should be made available in one appropriation.

In compliance with law the board reports that there are no questions of terminal facilities, water power or other subjects, aside from local cooperation as proposed above that are so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

O

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

HOUSE OF REPRESENTATIVES { DOCUMENT

Digitized by Google

Digitized by Google

62D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 550.

BUFFALO HARBOR, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND SURVEY OF BUFFALO HARBOR, N. Y., WITH A VIEW TO SECURING INCREASED DEPTH IN THE OUTER HARBOR AND ENTRANCE THERETO.

FEBRUARY 19, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 17, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 16th instant, together with copies of reports from Lieut. Col. J. G. Warren, Corps of Engineers, dated October 20, 1910, and June 10, 1911, with map, on preliminary examination and survey, respectively, of Buffalo Harbor, N. Y., made by him in compliance with the provisions of the river and harbor act of June 25, 1910.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 16, 1912.

SIR: I have the honor to submit herewith, for transmission to Congress, reports dated October 20, 1910, and June 10, 1911, with map, by Lieut. Col. J. G. Warren, Corps of Engineers, on preliminary

Digitized by Google

examination and survey, respectively, called for by the river and harbor act of June 25, 1910, of Buffalo Harbor, N. Y., with a view to securing increased depth in the outer harbor and entrances thereto.

The depth considered as adequate and required for Buffalo outer harbor is 20 feet at all stages of water level. To secure this at low water, which occurs annually after September, a depth of 23 feet at mean lake level is required. This depth already practically prevails in the outer harbor, except in two places, designated areas A and B on the map herewith, at the north and south ends of the harbor, respectively. The cost of excavating these areas to a depth of 23 feet at mean lake level (20 feet at low water) is estimated by the district officer at $123,900, with $1,000 annually for maintenance.

The situation at the south entrance, where the approach from Lake Erie has a depth of 28 to 30 feet, decreasing to 27 feet within the breakwater and to 23 feet within the outer harbor, is considered sufficient to meet the requirements of navigation. With the completion of certain rock removal provided for by the river and harbor acts of 1907 and 1910, there will be provided at the north entrance a controlling depth of 22 feet at mean lake level (19 feet at wind-produced low water) over an approach area 800 feet wide. The district officer proposes to excavate the area designated C to a depth of 25 feet and the area D to 23 feet at mean lake level (22 feet and 20 feet at low water), at an estimated cost of $500,850. No work of maintenance is expected to be required for several years.

The cost of all the work recommended by the district officer at the present time and which is considered by him to be urgent, i. e., as areas A, B, C, and D, is $624,750, with $1,000 annually for maintenance. Other work deemed commendable by the district officer but not urgent, is the excavation of area E, at the north entrance, to a similar depth to that proposed for area C, at an estimated cost of $378,000, and he suggests that this work could most advisedly be done after the completion of the work in area C, under a new continuing contract, the appropriations therefor to be provided in two equal installments. The division engineer concurs in the opinion of the district officer.

These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and the board concurs in the opinion of the district officer and the division engineer that it is advisable for the United States to do the work proposed by the district officer and designated by him as necessary and urgent.

After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress, I report as follows: (a) That the improvement by the United States of Buffalo Harbor, N. Y., with a view to securing increased depth in the outer harbor and approaches thereto, is deemed advisable so far as to secure an available depth of 23 feet at mean lake level in the outer harbor over the areas designated A and B, and depths of 25 and 23 feet, respectively, at mean lake level, over the areas designated C and D at the north entrance, at an estimated cost of $624,750 for first construction, and $1,000 annually for maintenance; these estimates being based on the supposition that the work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $290,000.

Digitized by Google

and subsequent appropriation of $167,375 per year for two years; and (*b*) that the excavation of area E, while commendable, is not urgent and not now recommended.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, U. S. Army.

The SECRETARY OF WAR.

PRELIMINARY EXAMINATION OF BUFFALO HARBOR, N. Y.

UNITED STATES ENGINEER OFFICE,
Buffalo, N. Y., October 20, 1910.

GENERAL: In compliance with instructions in department letter dated August 4, 1910, I have the honor to submit the following report on a preliminary examination of "Buffalo Harbor, with a view to securing increased depth in the outer harbor and entrances thereto."

The locality is shown on United States Lake Survey chart, "Buffalo Harbor and Niagara River to the Falls," index No. 312.

The Buffalo outer harbor is formed by the Buffalo Breakwater, which extends along the Buffalo lake front from Stony Point to the head of Niagara River, a distance of about 4½ miles, generally parallel to the lake shore and 3,000 feet lakeward therefrom.

The breakwater is built in four sections:

First. The north breakwater, 2,203.5 feet long, protecting the lake front and entrance to Erie Basin and Black Rock Harbor north of the Buffalo River entrance. Second. The old breakwater, 7,608.6 feet long, between which and the north breakwater is the present north entrance to the inner and outer harbors, with an available width of 1,000 feet. Third. The south harbor section, beginning at a point abreast of the southerly end of the old breakwater, but 250 feet to lakeward, so as to leave a fair-weather entrance 250 feet wide, and extending thence southerly 9,989 feet to the south entrance, which has an available width of 550 feet, with 28 feet depth. Fourth. The Stony Point section of breakwater, 2,802.9 feet long, extending from the south entrance to the shore of Stony Point.

An extension to the Stony Point section forms a protection arm for the south entrance. This arm begins at the outer end of the Stony Point section and extends 1,000 feet lakeward at an angle of 150°.

The portion of the outer harbor to be considered is that lying between the north or Buffalo River entrance and the south entrance; and the entrances to be considered are the north and south entrances from Lake Erie.

Outer harbor.—Length, from north entrance, Buffalo breakwater north end light, to south entrance, Buffalo breakwater south side light, 3½ miles. There is an established United States harbor line 1,600 feet from and parallel to the breakwater which coincides generally with the 18-foot contour of water depth.

The area of this outer harbor is about 680 acres; over 570 acres of this area the depth of water is 19 to 30 feet at mean lake level; over the remainder, along the harbor line, the depth of water is 15 to 19 feet.

Digitized by Google

This is all good anchorage ground and mooring facilities are a- provided along 7,714 feet of the breakwater (none along the sto portions, one 1,910 feet, and one 9,883 feet long).

This outer harbor, in addition to providing a safe place of refu and anchorage, is used as a channelway by lake vessels entering a the north entrance and bound for the Lackawanna Steel Co., Buffa & Susquehanna Iron Co., and Pennsylvania Railroad Co. ore deck at the south end of the harbor; and by vessels entering at sout entrance bound for the Buffalo River or inner harbor.

Such use by the largest and deepest draft vessels on the lakes extensive, but under present conditions the depth of water is n adequate for safe unobstructed navigation and for the maneuveri of deep-draft vessels going to or leaving anchorage or moorings.

The adequate depth required is 20 feet at all stages of water level and to secure this depth at low water, which occurs annually afte September, a depth of 23 feet at mean lake level is required.

At the northerly end of the outer harbor, adjoining the Buffal River entrance channel, an area about 2,000 feet in length and 1,6 feet wide, from the breakwater to the harbor line, is less than 23 fe deep at mean lake level, there being many shoal spots on which th depth is only 19 to 20 feet.

Thence southerly to the south entrance the depth is more than 2 feet at mean lake level for at least 800 feet of the harbor width 1,600 feet, and the depth over the remaining 800 feet of harbor width adjoining the harbor line, decreases gradually to 15 to 19 feet alon the harbor line.

This limited width of the adequate depth area at the south entran implies difficulty and obstruction to navigation, for the reason tha large vessels, 400 to 600 feet long and 18 to 20 feet draft, can n make the turn required at the south entrance without entering th shoal water and going aground.

The harbor-line frontage is all under-water land, unoccupied and un improved. It is practically all owned by railroad corporations, excep 2,935 linear feet at the northerly end, which is owned by or unde the control of the United States (War Department). Negotiation between the city of Buffalo and landowners have been in progres for several years with a view to a systematic improvement for commercial and industrial purposes in connection with lake navigation.

No conclusions have yet been reached and it is not probable tha any dock facilities will be provided along this frontage for severa years to come.

No work of improvement to secure increased depth in this oute harbor has ever been done, nor has it been included in any adopte project for improvement.

North entrance.—Clear width of opening between the north an old sections of the breakwater, 1,300 feet. The entrance channe within the breakwater to the Buffalo River channel between th United States north and south piers has been dredged 300 feet wide 23 feet deep at mean lake level, and with funds on hand will b increased to 400 feet wide in 1911. This increased width will be o the southerly side adjoining the outer harbor hereinbefore considered and the completed channel will fully meet the requirements of navigation.

Digitized by Google

The approach to this entrance, in Lake Erie, outside of the breakwater, is over irregular bedrock bottom. The depth of water on the high rock areas or shoals ranges from 20½ to 21½ feet at mean lake level, and their distribution over the approach channel is such as to make them controlling depths over an area about 1,500 feet long by 1,000 feet wide, within which vessels entering or departing must swing through an angle of 40° and counteract drifting in a cross current.

An appropriation of $56,100 was made by the river and harbor act of March 2, 1907, for excavating rock shoals, and excavation to the depth of 23 feet at mean lake level will be completed in 1910 over the main shoals in the southerly half, or 500 feet of the approach channel 1,000 feet wide. With $37,400 provided by special appropriation in the river and harbor act of June 25, 1910, the main shoals in the north half of the approach channel will be removed in 1911 to the extent admissible with these funds.

The controlling depth will then be 22 feet at mean lake level, 20.3 feet at low water under normal conditions, and 19 feet at low water produced by strong easterly winds for periods of not over 12 hours, about 10 times per year.

South entrance.—Clear width of opening between the south harbor and Stony Point sections of the breakwater, 600 feet. The approach to this entrance in Lake Erie has 28 to 30 feet depth of water and the depth within the breakwater is 27 feet, decreasing to 23 feet, to the entrances of the Lackawanna Steel Co., and Buffalo-Susquehanna-Pennsylvania Canals. The depth north of this entrance, in the outer harbor hereinbefore considered, is not less than 23 feet at mean lake level, 800 feet in from the breakwater.

This entrance is considered to meet the requirements of navigation.

The lake commerce of Buffalo Harbor in 1909 amounted to 14,145,013 tons of freight received and shipped in 6,659 vessels of 14,171,387 registered tonnage. This commerce is largely carried on by the large lake vessels 400 to 600 feet long which enter by both the north and south entrances and use the outer harbor as a channel-way between entrances and as an anchorage and mooring place. Their draft is 17 to 20 feet.

In view of the fact that part of the outer harbor and the north entrance are of less depth than that required for safe and unobstructed navigation by vessels of the draft stated, I am of the opinion that Buffalo Harbor is worthy of improvement by the General Government as follows:

Outer harbor.—To the extent of increasing the depth to 23 feet at mean lake level for a length of 2,000 feet at the northerly end and of 2,200 feet at the southerly end.

North entrance.—To the extent of increasing the depth of the approach channel in Lake Erie outside of the breakwater to 25 feet at mean lake level for an adequate width in order that deep-draft vessels may safely navigate in the cross currents and make the required turn without liability of striking rock bottom in heavy seas and during periods of low water.

A survey necessary for the preparation of a report with plans and estimates of cost of the proposed improvement can be made without allotment of funds.

Digitized by Google

No persons have been specially invited to submit their views in regard to the improvements considered in this report for the reason that the views of the commercial interests are known to be embodied and fully represented in the letter of the Chamber of Commerce of Buffalo, by J. J. H. Brown, chairman harbor committee, appended hereto.

This harbor committee called at this office on October 14, 1910 and confirmed the views presented in their letter.

Very respectfully, your obedient servant,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

UNITED STATES ENGINEER OFFICE, LAKES DIVISION,
Detroit, Mich., October 31, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendation of the district officer, that a survey be made to determine the cost of increasing the depth of the outer harbor to 23 feet at certain specified localities and of increasing the depth of the approach channel to the north entrance to 25 feet for an adequate width.

CHAS. MCD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 14, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

After describing Buffalo Harbor, the several structures protecting it, and the channels leading thereto, the district officer expresses the opinion that the harbor is worthy of improvement to the extent of increasing the depth in the outer harbor to 23 feet at mean lake level for a length of 2,000 feet at the northerly end and of 2,200 feet at the southerly end, and of increasing the depth of the approach channel in the north entrance to 25 feet at mean lake level for an adequate width, in order that deep-draft vessels may safely navigate in cross currents and make the required turns without liability of striking rock bottom in heavy seas and during periods of low water. He states that the necessary surveys, with plans and estimates, can be made without an allotment of funds. The division engineer concurs in recommending the survey for the purpose of determining the cost of the work involved.

The object sought by this examination is an increase in depth in the outer harbor and in the entrances thereto. It appears that the depth is adequate at the south entrance, but that at the north entrance there is insufficient depth in times of high waves or low water for the large vessels now using this harbor. The width of the outer harbor between the breakwater line and the harbor line is about 1,600 feet. The depth over the greater part of this width

Digitized by Google

appears sufficient for present needs, except for a short distance north of the south entrance and south of the north entrance, where large vessels must turn in order to proceed through or into the outer harbor. It is proposed at these points to increase the available width somewhat to a depth of 23 feet at mean lake level.

The magnitude and importance of the commerce of this lake port are well known and will not be referred to at this time, except to state that the amount of freight carried into and out of this harbor is now in excess of 14,000,000 tons annually. This is sufficient, in the opinion of the board, to warrant improvement necessary to facilitate its handling, provided the cost of the work involved is not disproportionate.

The board therefore concurs with the district officer and the division engineer in recommending that a survey be authorized to determine the cost of the improvement necessary to meet present urgent needs of commerce and navigation.

For the board:

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 22, 1910.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Bufialo Outer Harbor, N. Y., and entrance thereto, authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

EDW. BURR,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT, *November 23, 1910.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

LETTER OF THE BUFFALO CHAMBER OF COMMERCE.

CHAMBER OF COMMERCE OF BUFFALO,
November 20, 1907.

DEAR SIR: Since the completion of the breakwater system at Buffalo, extending from the entrance to the Buffalo River to Stony Point, there has been a constant increase in the use of the harbor facilities thereby provided for the mooring of vessels awaiting berths at elevators, coal trestles, docks, or warehouses of the inner harbor to discharge or take on cargoes.

This portion of the harbor also provides a safe place of refuge during storms and would provide a channel for the large lake vessels going from the Buffalo River to the steel plant, blast furnaces, or ore docks at the southerly end of the harbor were the channel between the harbor line and the breakwater system of uniform depth.

Digitized by Google

The harbor line as established by the War Department is approximately midway between the shore line and the breakwater system, thereby providing a channel for navigable purposes of approximately 1,600 feet in width. The depth of water in this channel, protected by the breakwater system from the entrance to the Buffalo River to Stony Point, varies from 19 feet to 30 feet, as indicated upon Government charts and according to data. There are, however, shoals and bars along this channel which are a menace to its safe navigation by the large vessels now navigating the Lakes and make difficult the safe maneuvering of vessels passing to or from mooring points.

We especially call your attention to conditions at the northerly end of this channel just inside of its junction with the entrance to the Buffalo River. At a distance of approximately 1,000 feet southerly from the lighthouse located upon the breakwater is a rock shoal with a depth of only 17 feet, and for a distance of approximately 2,000 feet from the entrance to the Buffalo River and adjacent to the lands owned by the United States Government vessels drawing less than 19 feet have been known to touch the bottom and released only by the rise of water or with the assistance of tugs. Similar conditions likewise obtain at intervals through the outer harbor to Stony Point.

The chamber of commerce invites your attention and respectfully requests your consideration to a recommendation that from moneys heretofore appropriated and not expended contracts be made to remove the shoals above referred to, and, in so far as the funds available will permit, clear this channel of obstructions so as to make same safe and navigable for vessels.

The need of this channel being of uniform depth throughout its length and from the harbor line to the breakwater system is made apparent by the increasing length of vessels being built and now operated upon the Lakes. The modern and average length of vessels at present is 600 feet. The distance required to turn such a vessel is at least double its length, and even if the channel were improved, as we so greatly desire, the full width of 1,600 feet, sufficient space would only be provided for the maneuvering of vessels with others passing.

Negotiations between the city and owners of lands along the outer harbor are proceeding satisfactorily, and it is hoped that at an early day an agreement will be consummated by which these lands may be improved to the harbor line for commercial and industrial purposes.

We submit herewith a plan of the outer harbor [1] and have indicated thereupon particularly the points hereinbefore referred to as seriously affecting its utilization by vessels using the harbor as a place of refuge or for mooring and navigating purposes.

Very truly, yours,

CHAMBER OF COMMERCE OF BUFFALO,
By J. J. H. BROWN,
Chairman Harbor Committee.

Gen. A. MACKENZIE,
Chief of Engineers, United States Army,
Washington, D. C.

SURVEY OF BUFFALO HARBOR, N. Y.

UNITED STATES ENGINEER OFFICE,
Buffalo, N. Y., June 10, 1911.

GENERAL: In compliance with instructions in department letter of November 28, 1910, I have the honor to submit the following report of survey, with estimate of cost, of improvement and maintenance of "Buffalo Harbor, N. Y., with a view to securing increased depth in the outer harbor and entrances thereto."

In the report on a preliminary examination of this proposed improvement, submitted October 20, 1910, the breakwater system, forming the Buffalo outer harbor and the north and south entrances thereto, is described, followed by descriptions of the outer harbor, north entrance, and south entrance, and their present condition.

The commercial interests involved are also noted in the report on the preliminary examination and need not be repeated here.

[1] Omitted.

Digitized by Google

The improvements considered worthy and proposed, as stated in the report on preliminary examination, are as follows:

Outer harbor.—To the extent of increasing the depth to 23 feet at mean lake level for a length of 2,000 feet at the northerly end and of 2,200 feet at the southerly end.

North entrance.—To the extent of increasing the depth of the approach channel in Lake Erie outside of the breakwater to 25 feet at mean lake level for an adequate width; in order that deep-draft vessels may safely navigate in the cross currents and make the required turn without liability of striking rock in heavy seas and during periods of low water.

The survey and estimates of cost covered by this report were made to conform to the above-quoted proposed plan of improvement with a view:

(*a*) To secure the depth of 23 feet at mean lake level, 20 feet at low water, throughout the outer harbor; this depth being necessary for safe, unobstructed navigation and for maneuvering of deep-draft vessels going to or leaving anchorage or moorings.

(*b*) To secure the depth of 25 feet at mean lake level, 22 feet at low water, throughout the Lake Erie approach to the north entrance, at least 800 feet wide; this depth and width being considered the least necessary for safe, unobstructed navigation of deep-draft vessels entering and departing and passing one another at the locality.

The survey data required and used for plans and estimates in this report were derived from existing records and maps in the United States engineer office, Buffalo, N. Y.

There are submitted herewith two tracings [1] showing, with index map, the parts of the outer harbor and the north entrance it is proposed to deepen; and the estimates of cost of deepening and maintenance are as follows:

OUTER HARBOR.

Necessary and urgent.

North end, area A on map:	
Excavation to make 23 feet depth at mean lake level, 20 feet at low water, 325,000 cubic yards sand, etc., scow measure, at 20 cents.....	$65,000
South end, area B on map:	
Excavation to make 23 feet depth at mean lake level, 20 feet at low water, 265,000 cubic yards sand, etc., scow measure, at 20 cents.....	53,000
	118,000
Contingencies and engineering, 5 per cent.....	5,900
Total for outer harbor.....	123,900

Maintenance is estimated at not to exceed $1,000 per annum for removal of sand hummocks, formed by churning of vessel propellers, to release them when aground.

NORTH ENTRANCE.

Necessary and urgent.

Areas C and D on map:	
Excavation to make 25 feet depth at mean lake level, 22 feet at low water, area C—	
Sand, etc., 50,000 cubic yards, scow measure, at 20 cents.....	$10,000.00
Bedrock, 116,000 cubic yards, place measure, at $4.....	464,000.00
	474,000.00

[1] Extract of sheet 1 only printed.

Digitized by Google

Areas C and D on map—Continued.

Excavation to make 23 feet depth at mean lake level, 20 feet at low water, area D—

Sand, etc., 15,000 cubic yards, scow measure, at 20 cents	$3,000.00
Total	477,000.00
Contingencies and engineering, 5 per cent	23,850.00
Total, necessary and urgent	500,850.00

This channel will be stable and no funds for maintenance will probably be required for many years.

COMMENDABLE, NOT URGENT.

Area E on map:

Excavation to make 25 feet depth at mean lake level, 22 feet at low water, area E—

Bedrock, 90,000 cubic yards, place measure, at $4	$360,000.00
Contingencies and engineering, 5 per cent	18,000.00
Total, commendable, not urgent	378,000.00

This channel will be stable and no funds for maintenance will probably be required for many years.

The amount required for the proposed deepening of the outer harbor, in round numbers $124,000, is moderate compared to the extensive use thereof by large vessels, viz: those of 500 to 605 feet length and of 19 to 20 feet and more draft. Such use is not restricted to the season of navigation, but continues throughout the closed (winter) season, which is also the low-water period.

(12) On the index map herewith are shown the vessels composing the "winter fleet" 1910–11, as they occupied the outer harbor in December, 1910, and were actually located by transit.

(13) These vessels, 21 in number, all steel, 19 to 20 feet draft, valued at $6,057,000, held in storage 5,740,000 bushels of wheat and flaxseed valued at approximately $6,781,100 for delivery during January-March, 1911, at elevators as called for. When unloaded most of these vessels and others which held grain at inner harbor docks were loaded with coal and returned to the outer harbor anchorage awaiting the opening of navigation in April.

This winter use of the outer harbor is well established under modern commercial methods of utilizing the modern steel lake vessel.

The amount required for deepening the north entrance is necessarily large, due to the fact that practically all excavation outside of the breakwater is in bedrock.

As stated in the report on preliminary examination, excavation to the extent admissible with $93,500 heretofore appropriated will, when completed, probably in 1911, result in removing the rock shoal spots in the Lake Erie approach area 800 feet wide (area C) to controlling depth of 22 feet at mean lake level, 19 feet at wind-produced low water.

The width of 800 feet proposed for this entrance is the least considered to be required for safe navigation; in view of the fact that 75 per cent of the lake freight is carried in vessels of 3,000 to 6,000 and over tons net register, 400 to 605 feet long, 50 to 60 feet beam, and 18 to 20 feet loaded draft, and that such vessels entering and leaving Buffalo Harbor via north entrance must turn and pass one

Digitized by Google

another within the Lake Erie approach area through an angle of 40 degrees, and at the same time make allowance for drifting in cross currents.

The depth of 25 feet at mean lake level proposed for this entrance is deemed conservative. This is the project depth at Cleveland Harbor, where there is practically no rise and fall of water level due to winds. At Duluth-Superior Harbor, where the conditions of water level and sea are similar to those at Buffalo, the project depth is 30 feet.

The improvement of north entrance affects not only the commercial interests of Buffalo outer and inner harbor but also bears upon the Black Rock Harbor and channel improvement now nearing completion, which will provide a channelway 23 feet deep at mean lake level with a lock for the largest lake vessels to the natural deep-water harbor in Niagara River between Buffalo and Tonawanda, N. Y.

The Buffalo north entrance is the direct entrance from Lake Erie to this waterway.

In case the project is adopted by Congress, it would be most advantageous to the United States, as well as the interests of commerce, to do all of the urgent work under one continuing contract, the funds provided in the initial appropriation to cover all of the outer harbor work, viz, $123,900, and approximately one-third of the "necessary and urgent" north entrance work, viz, $166,100; total, $290,000; the remaining funds for the urgent north entrance work to be provided in two succeeding annual appropriations of $167,375 each.

This arrangement is considered most advantageous for the reason that wind and sea prevent excavation operations in the north entrance for about 50 per cent of the time and, if dredges can be kept in operation on the sheltered outer harbor work at least a part of this time, the combination will lessen the cost of work.

The commendable but not urgent work in area E would, most advisedly, be done after the completion of the work in area C, under a new continuing contract, the funds provided in the initial appropriation to cover one-half of the estimated cost of $378,000, viz, $189,000; the remaining half to be provided in the succeeding annual appropriation.

Very respectfully, your obedient servant,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., June 15, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendations of the district officer.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer

Digitized by Google

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 26, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

A survey of Buffalo Harbor having been made by the district officer, he submits estimates of cost of certain excavation in the outer harbor and north entrance, at areas indicated on the accompanying map, as follows:

Outer harbor:	
North end, area A, excavation to provide 23 feet depth at mean lake level, 20 feet at low water	$65,000
South end, area B, excavation to provide 23 feet depth at mean lake level, 20 feet at low water	53,000
	118,000
Contingencies and engineering, 5 per cent	5,900
Total	123,900
Maintenance not to exceed $1,000 per annum.	
North entrance:	
Area C, excavation to provide 25 feet depth at mean lake level, 22 feet at low water	$474,000
Area D, excavation to provide 23 feet depth at mean lake level, 20 feet at low water	3,000
	477,000
Contingencies and engineering, 5 per cent	23,850
	500,850

It is stated that this channel will be stable, and no funds for maintenance will probably be required for many years.

The work covered by the above estimates, aggregating $624,750, the district officer regards as necessary and urgent. Other work deemed commendable, but not urgent, is the excavation of area E at the north entrance, at an estimated cost of $378,000. The work proposed in the outer harbor is designed chiefly to meet the needs of the large steel vessels of 500 to 600 feet length and 19 to 20 feet and more draft, which use the harbor not only during the season of navigation, but also during the winter season, when they hold in storage large quantities of grain for delivery at elevators as called for, and are subsequently loaded with coal and returned to the outer harbor anchorage to wait the opening of navigation. The district officer regards the depth of 25 feet proposed by him for area C at the north entrance as conservative, in view of the fluctuations of water level due to winds; and the width of 800 feet proposed for this entrance is the least required for safe navigation by vessels of the class calling at this port.

After consideration of the commerce of this harbor, and the present and prospective needs of navigation, the board concurs with the district officer and division engineer in believing that it is advisable for the General Government to do the work proposed in the outer harbor and north entrance, designated as necessary and urgent, at a total estimated cost of $624,750. It is recommended that the initial appropriation be $290,000, with two succeeding annual appropria-

Digitized by Google

tions of $167,375 each. The work on area E, stated by the district officer as being commendable but not urgent, is not now recommended by the board.

In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed as to be advantageously coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

O

JAN 28 1914

Digitized by Google

Digitized by Google

House Doc. No. 550; 62d Cong., 2d Sess.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

UNIVERSITY OF MICHIGAN
3 9015 06225 8572

Digitized by Google

Digitized by Google